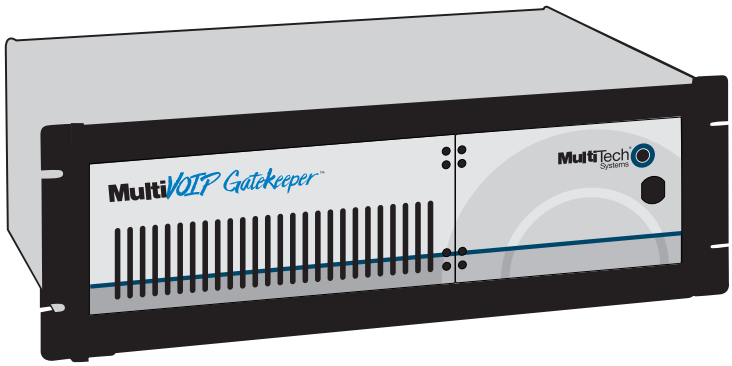
MultiVOIP Gatekeeper



MultiVOIP Gatekeeper
Model MVPGK1

Hardware User Guide

MultiTech® Systems

User Guide

S0000122, Revision B

MultiVOIP Gatekeeper (Model MVPGK1)

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Trademarks

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Chapter 1 Introduction/Description

System Overview

Introduction

Welcome to Multi-Tech's new MultiVOIP™ Gatekeeper, Model MVPGK1, a turnkey hardware and software solution that enables network managers and intranet managers to define and control how H.323 voice traffic is managed over IP networks. The MultiVOIP Gatekeeper is a complementary product to the MultiVOIP 200 (MVP200), the 2-Voice/Fax channel product and the MultiVOIP 400/800 (MVP400), 4-Voice/Fax channel product, and the MVP800, the 8-Voice/Fax channel product. The MultiVOIP GateKeeper is an industry-standard mechanism for call control and routing, basic telephony services, H.323 bandwidth usage control, total network usage control, and overall system administration and security policies. It includes fast, easy-to-use interfaces that network managers can use to modify or update zone configurations when an individual on the network needs additional services. And, it provides call centers with the capability to perform needs-based call routing as well as providing a variety of other automatic call distribution features.

The MultiVOIP GateKeeper is a ruggedized, expandable, 19-inch rack mount unit that includes a built-in hard drive, a 3.5-inch floppy drive, and a CD-ROM drive. Its removable card cage has six circuit board slots: one slot on the lower left side of the card cage is dedicated to the single-board computer (SBC); also, there is one combo slot (PCI or ISA) and four PCI slots.

The IPC-551 SBC is a full size plug-in PC board with PCI bus architecture, a 233 MHz processor, 256 MB of DRAM, Award BIOS, and "Green" PC functions that enable the computer to operate at a decreased power level after it senses a period of idleness. In one of the PCI slots is an EN10100PCI Ethernet adapter card that is a Plug and Play device with data transfer rates of either 10 Mbps (Ethernet) or 100 Mbps (Fast Ethernet), selected via auto-negotiation.

Technical Specifications

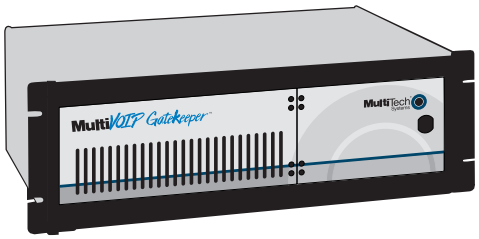


Figure 1-1. MultiVOIP™ Gatekeeper

The Gatekeeper conforms to the following technical specifications.

Chassis

- 6-slot PCI/ISA backplane
- SBC
- 10/100Mb PCI EtherNet NIC
- One half-height 1.44Mb 3½-inch floppy disk drive
- One half-height IDE hard drive
- One 250-watt power supply
- One 32x CD-ROM Drive
- Power on/off switch on front panel with built in power LED.
- Full security locking

Power Supply

AC Input

- Power requirement: 115/230V; 7A/4A (RMS) selectable by slide switch
- Frequency: 50-60 Hz
- Efficiency: >65% @ full load, nominal line

DC Output

- Outputs: +5 @ 25A, +12 @ 10A, -5 @ 0.5A, -12 @ 0.5A
- Inrush current: <30A peak @ 115VAC, cold start at 25° C
- Line regulation: +/- 5% at full load for +/-5V, +/-12V, +/-10% for -12V
- Hold Time: 12ms at full load @ 115VAC

Note: 3.3 volts, DC, is available at PCI expansion slots on one side of the backplane only, because PCI expansion cards made by some other manufacturers may require 3.3 volts. Any such boards must be installed in the Gatekeeper on the side of the chassis where the Single-Board Computer is located. Since there is no 3.3-volt supply on the other side of the backplane, such PCI expansion cards will not operate properly in those positions.

Dimensions and Weight

- Height: 5.25 inches
- Width: 19 inches

- Depth: 17 inches
- Weight: 28 lbs. (12.7 kg)

Environmental

- Temperature: 0–40° C
- Humidity: 10–90% RH noncondensing
- Fan Rating: 25 cfm

SBC (Single Board Computer)

Intel 54C/55C.

320/321 pin PGA socket.

233 MHz clock generator.

2.8V - 3.5V voltage regulator.

Memory:

Up to 256MB, EDO/Fast Page Mode DRAM.

Four 72-pin SIMM sockets on board.

Cache:

L1 Cache: 32k.

L2 Cache on board: 512k.

Real-Time Clock/Calendar:

CMOS data backup from BIOS setting or BIOS default.

Dallas DS 12887 Real Time Clock.

BIOS:

Award Flash BIOS with plug & play functionality.

Easily updated 128/256KB flash EEPROM.

Supports "Green" power-saving function .

Supports System IO Setup.

Keyboard Connector:

PC/AT type miniature DIN connector.

Supports PC/AT, PS/2 Keyboard or PS/2 Mouse; determined by jumper selection.

Bus Support and Speed:

External ISA bus at 8 MHz.

External PCI bus at 33 MHz.

Internal PCI bus, for VGA & IDE at 33 MHz.

PC-104 bus at 8 MHz.

Display:

Supports SVGA for CRT.

Supports 32-bit PCI Local Bus.

VGA BIOS combines 128/256KB flash ROM with system BIOS.

Supports 15 pin connector 1024 x 768 resolution (256 colors) on SVGA Monitor.

Supports 2 MB video memory.

Watchdog Timer:

The watchdog timer is controlled by software. Once enabled, the system will reboot, unless the timer is re-enabled before the specified timeout duration expires. Timeout durations range from zero to 30 seconds in two-second increments (+/- 25%).

To enable watchdog timer: use I / O port 0443H

To disable watchdog timer: use I / O port 0441H

IDE Interface:

Two IDE ports. Supports up to four Enhanced IDE devices.

Floppy Disk Driver Interface:

Supports up to two floppy disk drives: 3.5" and 5.25" (360K / 720K / 1.2M / 1.44M / 2.88M).

Serial Port:

Two high-speed 16550-compatible UARTs with Send / Receive 16-byte FIFOs.

MIDI Compatible.

Programmable Band Rate Generator.

Parallel Port:

Bi-directional parallel port, supports SPP, ECP, and EPP.

"Green" Power-Saving Function:

Software support determined by BIOS setup.

LED Indicators

System power (at jumper KBL1 on board).

Hard Disk access (at jumper HDL1 on board).

DMA Controller:

82C37 x 2

DMA Channels:

7

Interrupt Controllers:

82C59 x 2

15 levels

Operating Temperature:

0 to60°C (32 to 140°F).

System Power Requirements :

DC Voltage: +5V; minimum +4.75V, maximum 5.25V.

DC Ampere: 15A.

Board Dimensions:

338.5 mm x 122 mm (13.33 in. x 4.80 in.)

Board Net Weight:

0.4 Kg. (14.1 oz.)

NIC Board (EN10100 PCI Card)

The EN10100PCI card was designed to meet the following specifications:

Network Type:

· Fast Ethernet 100Base-TX (IEEE 802.3u standard for 100 Mbps baseband CSMA/CD LAN)

· Ethernet 10BASE-T (IEEE 802.3 standard for 10 Mbps baseband CSMA/CD local area network)

Jumperless Hardware, with auto-negotiation functionality

Media interface: RJ-45

LAN Chip Set:

· Interface controller: D-Link DL10030

· Transceiver interface: Davicom DM9101

EMI Compatibility:

· FCC Class B

· VCCI Class B

· CISPR B

· SMA Certification

· CE Certification, Class B

Host interface: PCI 2.1 Bus (Bus Master)

I/O & IRQ base address: assigned by Plug and Play system

Physical Dimensions: 13.9 cm x 7.3 cm

Environment:

· Storage: -20° to 80°C, (-4° to 176° F)

· Operating: 0° to 55° C, (32° to 131° F)

· Humidity: 10% to 90% non-condensing

Power Consumption: 2W (400mA @ 5V) max

Check *http://www.multitech.com* for drivers not listed and for the latest release of drivers.

Software drivers[1] for:

· Microsoft Windows NT4.0

· Banyan VINES v4.00 (2)

· DECnet PathWorks v4.0

· FTP PC/TCP

· IBM Communication Manager v1.0

· IBM LAN Server v4.0, v3.0, v2.0

· IBM LAN Support Program v1.3x

· Microsoft LAN Manager v2.1

· Microsoft Windows for Workgroups 3.11

· Novell Netware 3.x, 4.x ODI driver

· Win/TCP PathWay Access for DOS v1.1

Chapter 2 Installation and Setup

Introduction

This chapter explains how to set up and connect cables for the Gatekeeper. This product includes the Windows operating system and Gatekeeper software, and is ready to be connected to an Ethernet concentrator. The operator needs only to connect a VGA (or SVGA) monitor, keyboard, Ethernet cable, and mouse, boot the system, and enter some basic information. To connect the cables to a monitor and keyboard, see the *Cable Connections* section of this chapter.

Unpacking

Check the items on the Gatekeeper shipping list to ensure that you have received the correct options and accessories. Unpack the unit and inspect it for visible shipping damage. If damage is observed, do not power-on the unit; contact Multi-Tech's Tech Support for advice. If no damage is observed, place the Gatekeeper in its final location.

Safety Warning AC Power

Locate the AC outlet near the communication equipment. The AC power cord is your main AC disconnecting device and must be easily accessible at all times. For your safety, the power cord provided with your system has a grounding plug. Always use the power cord with a properly grounded wall outlet to avoid the risk of electrical shock.

Lithium Battery Caution

A lithium battery on the product provides backup power for the device's timekeeping capability. The battery has an estimated life expectancy of ten years.

When the battery starts to weaken, the date and time may be incorrect. If the battery fails, the unit must be sent back to Multi-Tech Systems for battery replacement.

Warning: There is danger of explosion if the battery is incorrectly replaced.

Laser Safety Caution

Class 1 LED Product.

The CD-ROM drive contains a laser system and is classified as a "Class 1 Laser Product" under a U.S. Department of Health and Human Services (DHHS) Radiation Performance standard according to the Radiation Control for Health and Safety Act of 1968.

If the unit ever requires maintenance, contact an authorized repair location.

Safety Warnings Telecom

1. Never install telephone wiring during a lightning storm.
2. Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations.
3. This product is to be used with UL and cUL listed computers.
4. Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.
5. Use caution when installing or modifying telephone lines.

6. Avoid using a telephone (other than a cordless type) during an electrical storm. There may be a remote risk of electrical shock from lightning.

7. Do not use the telephone to report a gas leak in the vicinity of the leak.

8. To reduce the risk of fire, use only No. 26 AWG or larger Telecommunications line cord.

Rack Mounting

***Caution**: To prevent personal injury or damage to the unit, two people should mount the Gatekeeper into the rack enclosure.*

The Gatekeeper fits in a standard 19-inch rack enclosure. Attach it securely to the rack enclosure with the four mounting screws included in your Gatekeeper kit.

When mounting the equipment in the rack, make sure the mechanical loading is even. Uneven mechanical loading creates the risk that the equipment rack may tip or fall or present other related hazards. The rack should safely support the combined weight of all the equipment that it holds.

***Note**: To keep the server cool enough, you need at least one inch of clearance behind the unit to allow air flow. If mounted in a rack enclosure or as a desktop unit, there must be a minimum of one inch between the back of the Gatekeeper and any wall or barrier.*

Cable Connections

The operator need only connect the Network Interface Card to the local area network.

The SBC board has cable connectors for adding a keyboard, a monitor, and a mouse or other serial device (on COM1). Cable connectors and boards are shown in Figure 2-1.

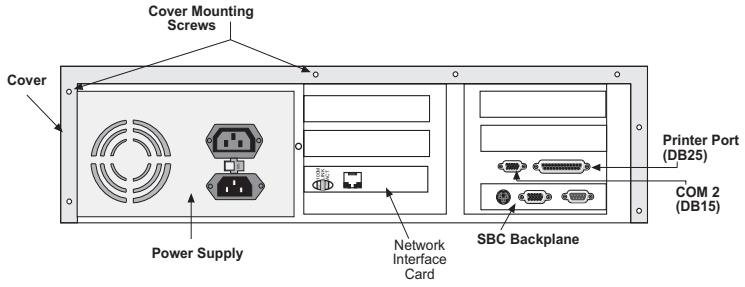


Figure 2-1. Back Panel Connectors

SBC Board Cabling

The SBC board is located in the Gatekeeper as shown in Figure 2-1. The SBC board cabling may involve connection to three back panel connectors (see Figure 2-2). The back panel connectors are:

- Keyboard connector
- Video connector
- COM 1 connector

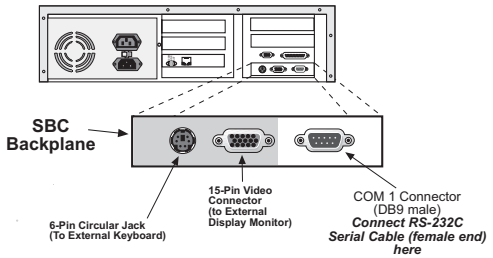


Fig. 2-2. SBC Backplane Connections

The left round connector is for a keyboard. The middle receptacle connects the video cable to a monitor. The right connector (COM 1) on the SBC's backplane typically accommodates a mouse or other pointing device. The SBC connector pinouts are shown and defined in Appendix A.

Note: *Any cables connected to the Gatekeeper should be shielded to reduce interference.*

NIC Cabling

The 10/100Mb PCI EtherNet Network Interface Card is located as shown in Figure 2-4. The NIC has a single RJ-45 connector and three LEDs.

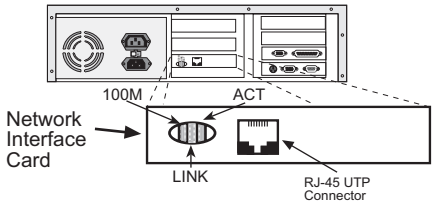


Fig. 2-4. NIC Board Connectors

Connect the appropriate network cable to the NIC in the Gatekeeper. The RJ-45 NIC connector is shown and defined in Appendix A.

Note: *Any cables connected to the Gatekeeper should be shielded to reduce interference.*

Powering Up

Note: This is pluggable equipment; the socket outlet must be installed near the equipment and must be easily accessible.

When connecting the equipment to the power-supply circuit, be sure to check equipment nameplate ratings to avoid overloading circuits. Overloaded circuits may cause damage to over-current protection devices and to power-supply wiring.

Make sure that the voltage selector on the power supply is set to the proper voltage prior to connecting this equipment to the main power. If the voltage selector needs to be changed, an ordinary pencil can be used to change the switch to the position which best correlates with the known input voltage. If the voltage selector is in the "115" position, input voltages from 100-120VAC may be applied to the equipment. If the voltage selector is in the "230" position, input voltages from 200-240 VAC may be applied to the equipment.

Connect the power cord supplied with the CommPlete 4000 to the power cord connector on the back of the cabinet and to an AC outlet. Press the power switch on the front of the cabinet to the ON position. The power switch contains an LED which should light when power is applied.

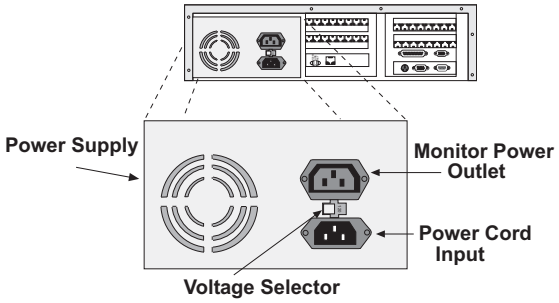


Fig. 2-5. Power Supply Connectors

Chapter 3 Single Board Computer

Introduction

This chapter introduces some of the features of the Multi-Tech Single Board Computer (or SBC), Model IPC-551, used in the Gatekeeper. Further details can be found in Appendixes A, B, and C.

About the SBC

The IPC-551 SBC is a full size plug-in PC board with PCI bus architecture, a 233 MHz Intel Pentium processor with MMX, 256 MB of dynamic random access memory (DRAM), Award PnP flash ROM BIOS, a watchdog timer, and a "Green" PC function that enables the system to operate at a decreased power level after it senses a period of inactivity.

The memory interface on the SBC consists of four 72-pin single in-line memory module (SIMM) sockets (two double DRAM banks) that can be used to configure memories ranging from 8MB to 256 MB. (Details are provided in Appendix C.) The 256 MB memory supplied with each Gatekeeper consists of four 64 MB memory modules.

The system BIOS and VGA BIOS on the SBC can be updated as necessary using the *Awdflash.exe* program provided on the system CD-ROM. (Details are provided in Appendix C.)

A watchdog timer (WDT) is provided on the SBC in case your system configuration requires that the Gatekeeper be remotely rebooted from time to time. Setup instructions for the WDT are also provided in Appendix C.)

The default condition for the "Green" PC function on the SBC board is Off. When activated, however, the green function slows down the Gatekeeper and shuts down certain computer functions in order to reduce power consumption. The three reduced-power operating modes built into the green function are: CPU Doze mode, System Standby mode, and System Suspend mode. See Appendix C for further details concerning the Green PC function.

Component Locations

Figure 3-1 displays component locations on the SBC board.

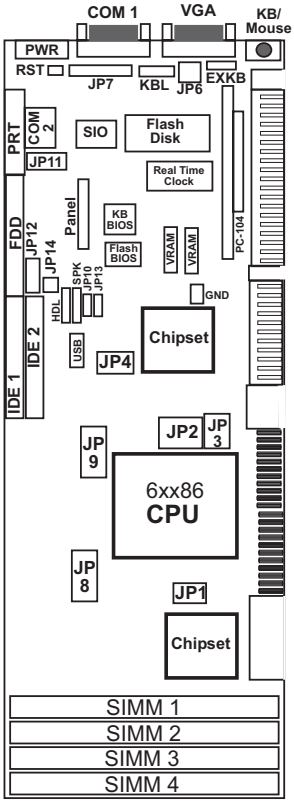


Figure 3-1: Connector, Jumper and Component Locations on the SBC Board

Chapter 4 PCI NIC Board

Introduction

This chapter documents the features and specifications for the Multi-Tech EN10100PCI (NIC board), a 10/100Mb Ethernet PCI bus NIC with Auto-negotiation (Figure 4-1).

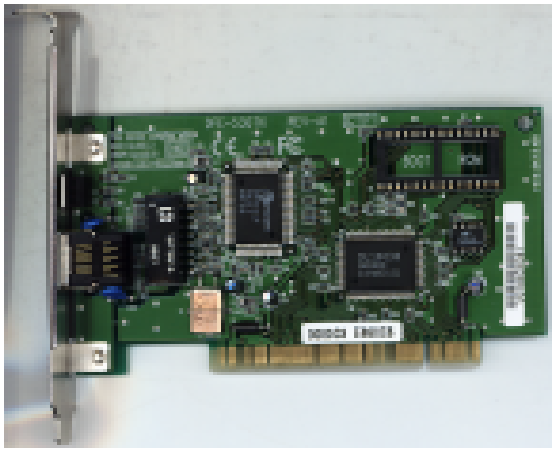


Figure 4-1. NIC Board

About Fast Ethernet

Fast Ethernet is a network technology specified by IEEE Standard 802.3u. It extends the traditional 10Mbps Ethernet technology to achieve 100Mbps transmission and reception, while retaining the same CSMA/CA Ethernet protocol. Thus while Fast Ethernet provides a tenfold increase in network capacity, it is wholly compatible with traditional 10Mbps Ethernet network facilities. This compatibility is the key to easy and efficient upgrades to 100Mbps in your network areas needing greater bandwidth. Upgrading selected areas to Fast Ethernet does not require hardware or software changes in network areas where traditional 10Mbps Ethernet is providing good service. For upgrading existing Ethernet installations to 100Mbps, and especially for selectively upgrading areas needing upgrade, Fast Ethernet is the clear choice in terms of cost-effectiveness, as well as convenience and smoothness in transition.

Fast Ethernet comprises two subtypes: 100Base-T4 and 100Base-TX. 100Base-T4 Fast Ethernet can use existing Category 3 or Category 4 UTP network cabling, but does not provide full duplex operation. 100Base-TX requires Category 5 cabling, but does provide full duplex operation. Full duplex 100Base-TX operation enables simultaneous transmission and reception, both at 100Mbps, thus providing service potentially equivalent to 200Mbps half-duplex service. The EN10100PCI Adapter does not support the 100Base-T4 subtype. To provide compatibility in traditional 10Mbps Ethernet environments (where, for example, EN10100PCI adapters are installed *anticipating* upgrade of supporting hub equipment to Fast Ethernet), the EN10100PCI also supports traditional 10 Mbps Ethernet operation, in full-duplex as well as half-duplex modes. Selection of the best operation mode in any given installation is automatically governed by auto-negotiation.

About Auto-negotiation

You have probably had the experience of making a dialup connection through a modem, and have heard the gravelly-sounding exchanges between your modem and the modem at the other end of the telephone line (these exchanges are ordinarily played out through a speaker in your local modem). As irritating as those few seconds of noise may be, they do let you know that your modem and the remote modem are on the job, preparing for your intended communication with the remote computer. The preparatory work of the two modems during those few seconds before you see the "Connect" message is to *negotiate* the best data communication scheme which is supported by both modems, and which is

suitable for the quality of the telephone line linkage between them. The parameters to be settled between the two modems include best baud rate, compression method, and error correction method. When the two modems have tested the phoneline quality and settled on the combination of shared options and parameters which will provide the best data communication over the connecting phone line, then you are given the "Connect" message which signals the end of the intermodem negotiation and the beginning of your intended communication with the remote computer.

Auto-negotiation between devices within an Ethernet LAN is similar in concept, but much briefer. The two devices involved in the auto-negotiation will be the EN10100PCI Adapter serving your station and the hub through which it is connected into the LAN. The options to be negotiated between the EN10100PCI and its supporting hub include Ethernet type (100BASE-TX Fast Ethernet or 10BASE-T Ethernet) and duplex mode (half-duplex, being one-way-at-a-time, or full duplex, being simultaneous transmit-and-receive). Startup communication between the two devices occurs when both devices are power-on, the cable connection between them is good, and the Network Operating System software is running. As soon as those conditions are satisfied, the preparatory process of auto-negotiation between the EN10100PCI and its supporting hub proceeds automatically. If the hub has auto-negotiation functionality, then it and the EN10100PCI exchange a series of messages in which each device signals its capabilities and listens for corresponding information about the other. The auto-negotiation process requires only a few milliseconds, and the two devices select the best communication parameters supported by both devices. If the hub does not have auto-engotiation functionality, then its monotone (single capability) message will be recognized by the EN10100PCI's auto-negotiation facility, and the EN10100PCI will simply switch to one of its own capabilities which matches that of the hub.

When the preparatory procedure of auto-negotiation is completed, then the line is ready and will provide a data channel which is optimal for the two devices. The line will remain ready without further auto-negotiation action until the linkage is broken. Auto-negotiation then reoccurs at any time that the linkage is restored, again making the line ready for optimal data communications.

About PCI Bus

Your EN10100PCI Adapter delivers outstanding performance by fully exploiting the advanced features of your computer's PCI bus. EN10100PCI Adapters utilize the Bus Master Mode of the PCI bus, enableing direct transfers of Ethernet packet content between computer memory and the adapter's controller, thus minimizing network demand on the CPU. The adapter's controller function provides the additional benefit of reduced command processing overhead. The working relationship between a EN10100PCI adapter and main memory working in Bus Master mode is powered by the Bridge/Memory Controller of the PCI bus. This reduces the CPU role in network operations, thus freeing the CPU to service other tasks, with resulting improvement in overall computing (multitasking) performance. At the same time, it produces superior network throughput by reducing latency (waiting for CPU service) during transmissions and receptions.

Features

Designed for versatility and performance, the EN10100PCI Adapter provides the following features:

· Operates in a PCI Bus Master slot of a Pentium computer, independent of CPU speed.

· PCI Bus Master memory access, for high throughput and low CPU demand.

· 32-bit Intelligent Ethernet controller.

· Complies with IEEE 802.3 100Base-TX and 10Base-T Ethernet standards.

· Plug and Play installation.

· RJ-45 connector for network cable connection.

· 100Mbps Fast Ethernet or 10Mbps Ethernet data transfer, selected via auto-negotiation.

· Full duplex or half-duplex operation, selected by auto-negotiation.

· Built-in FIFO buffers reduce overhead of memory transfers.

· Three LED indicators: 10Mbps/100Mbps, Link, Activity.

· Drivers for all leading Network Operating Systems.

LED Indicators

The EN10100PCI Adapter features three LED indicators to assist in the resolving of network diagnostics:

· 10Mbps/100Mbps SPEED Indicator

This LED shows steady green (on) when 100Mbps speed is selected. It is dark (off) when10Mbps is negotiated.

· LINK Indicator

Steady green indicates good linkage between the EN10100PCI and its supporting hub.

· ACTIVITY Indicator

Flashing green indicates that the adapter is sending or receiving.

Chapter 5 Hardware Removal/ Replacement

Introduction

This chapter's procedures describe removal and replacement of the main hardware components of the Gatekeeper. Before removing or replacing any component, disconnect the cables from the back of the Gatekeeper and remove the Gatekeeper from its rack enclosure per instructions. The Gatekeeper has been designed to make this process as efficient as possible, but if you experience problems, contact Multi-Tech Technical Support (see chapter 7).

Disconnecting Cables and Removal from Enclosure

The steps below describe how to remove the Gatekeeper from its rack enclosure. These steps must be followed before any internal component can be removed or replaced.

Warning: *Any time power is removed, turn off the Master Power* switch inside the front door.

Note: *In order to make re-connection easier, be sure to note or label all cable connections* before disconnecting any cables from the Gatekeeper.

1 Shut down Windows NT Server.

2 Remove the power cord from the back of the Gatekeeper.

3 If connected, disconnect the video, COM 1, and keyboard cables from the back of the SBC.

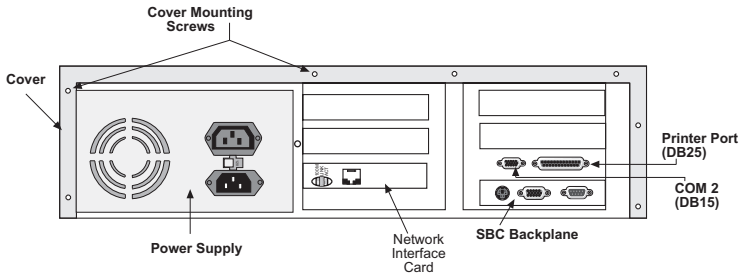


Fig.4-1. Back Panel Connectors

4 If a LAN is connected to the Gatekeeper , disconnect twisted-pair cable at the NIC.

5 Remove the four rack enclosure mounting screws from the front of Gatekeeper and remove the Gatekeeper from the rack enclosure. See Figure 4-2.

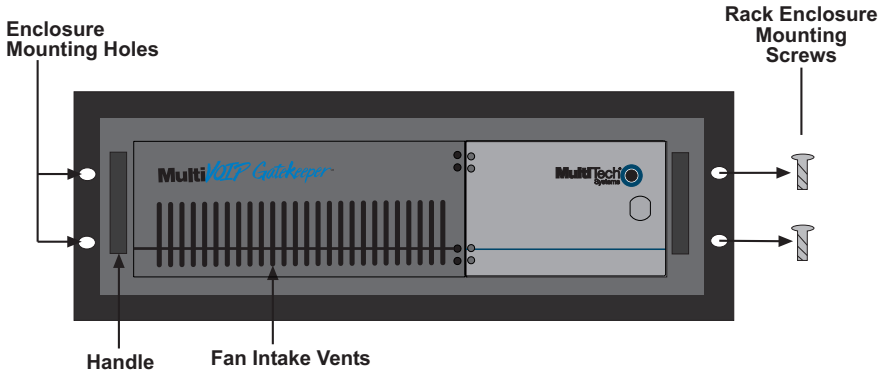


Fig. 4-2. Rack Enclosure Mounting Screws

6 To re-attach cables and re-mount the Gatekeeper, follow steps 1-5 in reverse order and sense. That is,

a. (Two people are needed.) Replace the Gatekeeper in the rack enclosure and secure it using the four mounting screws that were removed in Step 5.

c. Reconnect the Network Interface Card to the LAN with its twisted-pair cable.

d. Reconnect the SBC cables (to video, keyboard, and COM1).

e. Restore power when ready.

Card Cage Removal/Replacement

The steps below describe how to remove the card cage. Note that card cage removal is not always necessary to remove or replace some components. Specifically, expansion cards can be installed into or removed from the SBC side of the card cage without removing the card cage.

1 Remove the Gatekeeper from rack enclosure (two people are needed). Follow the procedure "Disconnecting Cables and Removal from Enclosure" presented above. Summary: after powering down the unit and disconnecting all power and signal cables, employ two people to remove its rack-mounting screws and lift the unit out of the rack.

2 To remove the top cover from the Gatekeeper, remove the seven cover mounting screws located in the back of the Gatekeeper. The cover slides off the back of the chassis.

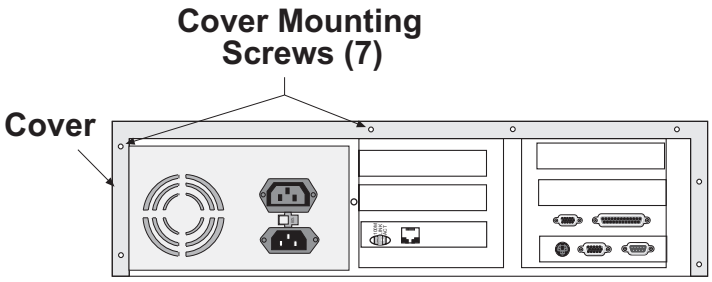


Fig. 4-3. Cover Mounting Screws

3 Remove two chassis mounting screws securing the card cage. See Figure 4-4.

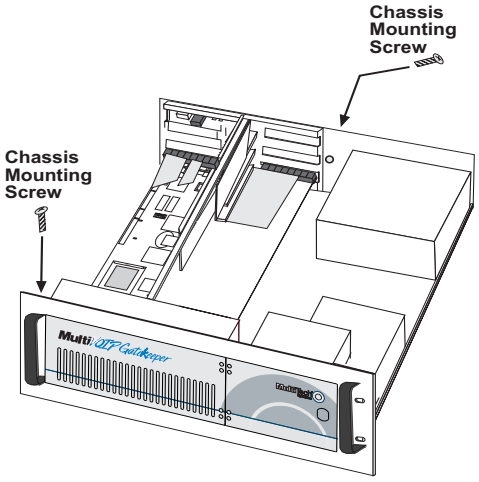


Fig. 4-4. Chassis Mounting Screws

4 Pull the card cage (including fan enclosure) straight up and out of the chassis. See Figure 4-5. Set it next to the chassis.

***Note**: Before placing the card cage back into the chassis, verify that the power connectors from the power supply to the backplane are fully attached. Figure 4-5b shows the wire colors and correct orientation of the power supply cables.*

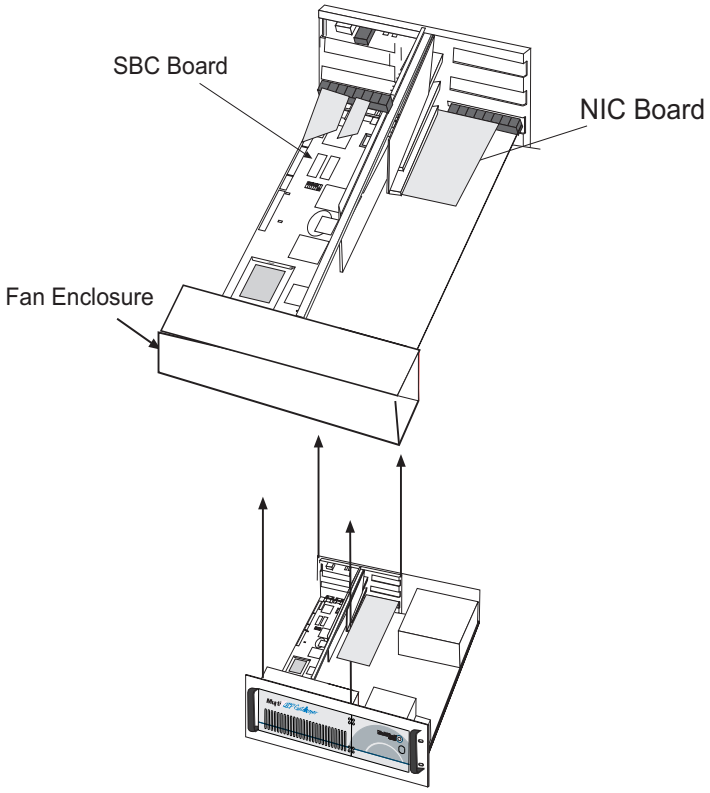


Figure 4-5a. Card Cage Removal

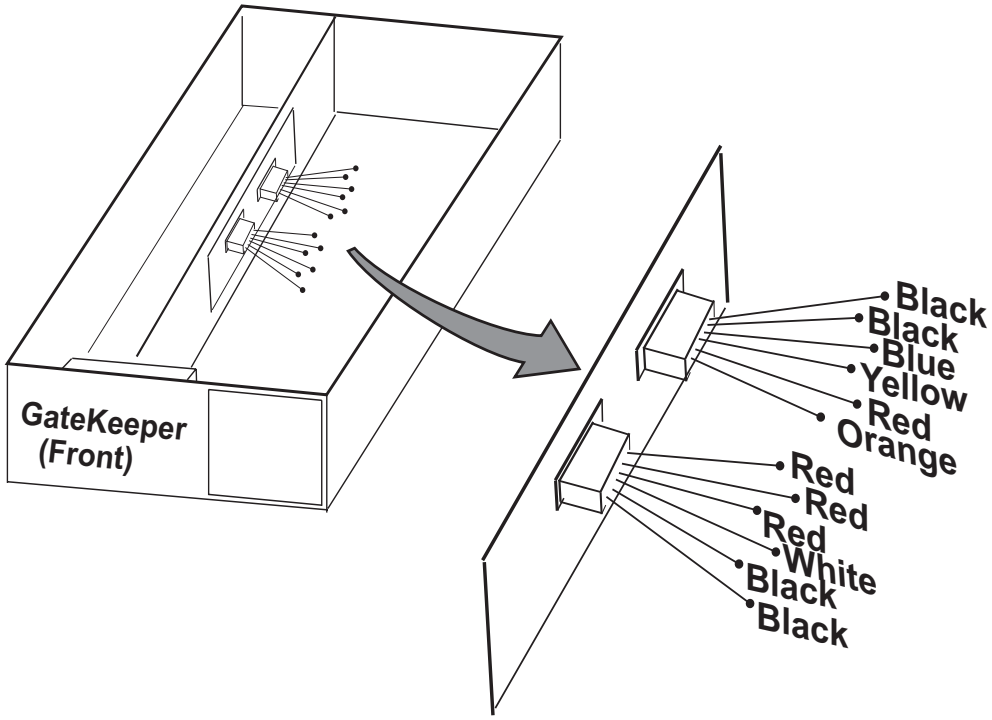


Figure 4-5b. Wire Colors and Orientation of Power Cables

Board Removal and Replacement

Removing SBC Board

1 Remove the Gatekeeper from rack enclosure (two people are needed). Follow the procedure "Disconnecting Cables and Removal from Enclosure" presented above. Summary: after powering down the unit and disconnecting all power and signal cables, employ two people to remove its rack-mounting screws and lift the unit out of the rack.

2 Remove the top cover from the Gatekeeper by removing the seven cover mounting screws located in the back of the Gatekeeper. (See Figure 4-3.)

3 Disconnect the four ribbon cables from the SBC. (See Figure 4-6.) Depending on your configuration, you may not have all four ports in use.

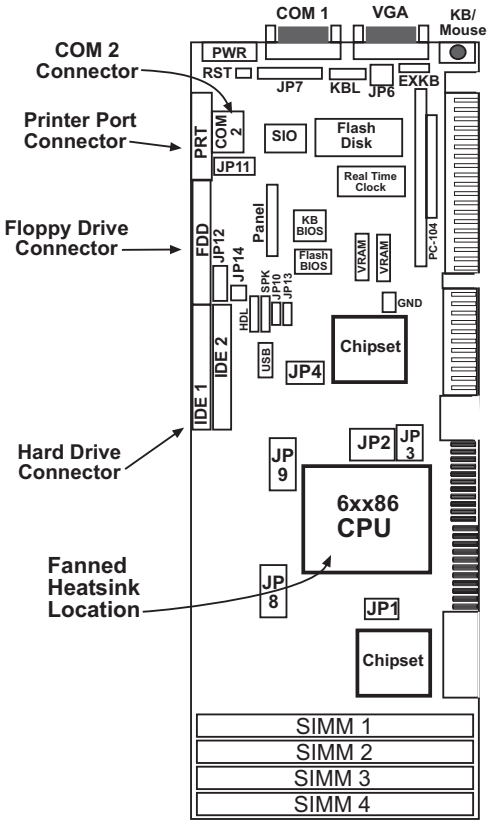


Figure 4-6. SBC Board and Ribbon Cable Connectors

4 Remove the fanned heatsink from the processor.

5 Remove the screw that secures the SBC board to the chassis at the back of the Gatekeeper, then unplug (remove) the SBC board from the midplane.

6 To replace the SBC board, verify SBC board configuration. Refer to the Hardware Configuration and Installation instructions in the SBC manual.

7 Install the new SBC board by following steps 1-5 in reverse order and sense. That is,

a. Attach SBC to its midplane socket and secure SBC to rear of chassis with screw.

b. Re-connect ribbon cables and reinstall fanned heatsink.

c. Replace top cover (7 screws).

d. (Two people are needed.) Replace Gatekeeper into rack enclosure.

Removing NIC Board

1 Remove the Gatekeeper from rack enclosure (two people are needed). Follow the procedure "Disconnecting Cables and Removal from Enclosure" presented above. Summary: after powering down the unit and disconnecting all power and signal cables, employ two persons to remove its rack-mounting screws and lift the unit out of the rack.

2 Remove the seven cover mounting screws (Figure 4-3), then slide the top cover off the back of the Gatekeeper.

3 Remove the two chassis mounting screws (front corner and back) securing the card cage. See figure 4-4.

4 Being careful to maintain slack in the power cables, lift the card cage up and over so it rests alongside the chassis.

5 Remove the screw that secures the NIC board to the chassis at the back of the Gatekeeper.

6 Remove the NIC board from the midplane.

7 To replace the NIC board, verify NIC configuration.

8 Install the new NIC board by following steps 1-4 in reverse order and sense. That is,

a. Attach NIC to its midplane socket.

b. Secure NIC to rear of chassis with screw.

c. Reinstall card cage (2 screws). Make sure the power cables are securely attached.

d. Replace top cover (7 screws).

e. (Two people are needed.) Replace Gatekeeper in its rack enclosure.

Hard Drive Removal/Replacement

1 Remove the Gatekeeper from the rack enclosure (two people are needed). Follow the procedure "Disconnecting Cables and Removal from Enclosure" presented above. Summary: after powering down the unit and disconnecting all power and signal cables, remove its rack-mounting screws and have two people lift the unit out of the rack.

2 Remove the top cover from the Gatekeeper by removing the seven cover mounting screws located at the back of the Gatekeeper. See figure 4-3.

3 Disconnect the power and data cables from the back of the hard drive.

4 Remove the three screws that secure the hard drive to the drive chassis. You must lift the card cage out of the chassis to gain access to the third screw.

5 Remove the hard drive by sliding it straight out the front of the drive chassis.

6 To install a new hard drive, follow steps 1-5 in reverse order and sense. That is,

a. Slide the hard drive straight back into the drive chassis.

b. Replace drive/chassis mounting screws(3).

c. Reconnect two cables (data and power).

d. Reinstall the card cage and secure it with two screws.

e. Replace top cover (7 screws).

f. (Two people are needed.) Reinstall Gatekeeper in rack enclosure.

Floppy Disk Drive Removal/Replacement

1 Remove the Gatekeeper from rack enclosure (two people are needed). Follow the procedure "Disconnecting Cables and Removal from Enclosure" presented above. Summary: after powering down the unit and disconnecting all power and signal cables, employ two people to remove its rack-mounting screws and lift the unit out of the rack.

2 Remove the top cover from the Gatekeeper by removing the seven cover mounting screws located in the back of the Gatekeeper. See figure 4-3.

3 Remove the two chassis mounting screws from the card cage. See figure 4-4.

4 Being careful to maintain slack in the power cables, lift the card cage, including fan housing, up and over so that it rests along side the chassis.

5 Disconnect the power and data cables from the back of the floppy disk drive.

6 Remove the four screws securing the floppy drive to the drive chassis.

7 Open the front door and remove floppy drive by sliding it out the front of the drive chassis.

8 To install a new floppy drive, follow steps 1-7 in reverse order and sense. That is,

a. Open front door and insert floppy drive into drive chassis.

b. Attach floppy drive to drive chassis (4 screws).

c. Reconnect power and data cables to floppy drive.

***Note**: Before installing card cage, make sure power connectors from power supply to midplane are fully connected (Figure 4-5b).*

d. Reinstall the card cage and attach it to chassis (2 screws).

e. Replace top cover (7 screws).

f. (Two people are needed.) Reinstall Gatekeeper in rack enclosure.

CD ROM Drive Removal/Replacement

1 Remove the Gatekeeper from rack enclosure (two people are needed). Follow the procedure "Disconnecting Cables and Removal from Enclosure" presented above. Summary: after powering down the unit and disconnecting all power and signal cables, employ two people to remove its rack-mounting screws and lift the unit out of the rack.

2 Remove the top cover from the Gatekeeper by removing the seven cover mounting screws located in the back of the Gatekeeper. See figure 4-3.

3 Remove the two chassis mounting screws from the card cage. See figure 4-4.

4 Being careful to maintain slack in the power cables, lift the card cage, including fan housing, up and over so that it can rest alongside the chassis.

5 Disconnect the power and data cables from the back of the CD ROM drive.

6 Remove the four screws securing the CD ROM drive to the drive chassis.

7 Open the front door and remove CD ROM drive by sliding it out the front of the drive chassis.

8 To install a new CD ROM drive, follow steps 1-7 in reverse order and sense. That is,

a. Open front door and replace CDROM drive in drive chassis.

b. Attach CD ROM to drive chassis (4 screws).

c. Reconnect power and data cables to CD ROM drive.

***Note**: Before installing card cage, make sure power connectors from power supply to midplane are fully connected (Figure 4-5b).*

d. Reinstall the card cage and attach it to chassis (2 screws).

e. Replace top cover (7 screws).

f. (Two people are needed.) Reinstall Gatekeeper in rack enclosure.

Power Supply Removal/Replacement

The card cage has to be removed in order to disconnect the power wiring before the power supply can be removed.

1 Remove the Gatekeeper from rack enclosure (two people are needed). Follow the procedure "Disconnecting Cables and Removal from Enclosure" presented above. Summary: after powering down the unit and disconnecting all power and signal cables, remove its rack-mounting screws and employ two people to lift the unit out of the rack.

2 Remove the top cover from the Gatekeeper by removing the seven cover mounting screws located in the back of the Gatekeeper. See figure 4-3.

3 Remove the screw that holds the ground wire by the power switch.

4 Disconnect wires going to the power switch. Take note of which color wires are attached to which connectors on the switch.

5 Remove the three power supply mounting screws from the back of the Gatekeeper.

6 Remove two screws and nuts that attach the power supply to the Gatekeeper chassis.

7 Remove the power supply from the chassis.

8 To install a new power supply, follow steps 1-7 in reverse order and sense.

a. Position the power supply in the chassis.

b. Attach power supply to chassis floor (2 screws and nuts).

c. Attach power supply to back of Gatekeeper chassis (3 screws)

d. Reattach power cables to hard drive, floppy drive, CDROM drive, and CPU fan.

e. Reattach power cabling to card cage.

g. Reattach power switch wires and ground wires.

h. Replace top cover (7 screws).

Chapter 6 Troubleshooting

Introduction

This section provides a variety of approaches should the Gatekeeper fail to operate properly. Your Gatekeeper was tested thoroughly at the factory before it was shipped. If you are unable to make a successful connection, it is possible that the Gatekeeper is defective. However, it is more likely that the source of your problem lies elsewhere. As with any microcomputer product, start with simple hardware and software problems and work toward more complex problems (e.g., operating system and/or applications).

Hardware Troubleshooting

The following material addresses some of the typical problems and provides some basic solutions. If a problem arises while you are in an application, see the software documentation.

- **No Video**
  - — Verify that power is ON (LED in power switch is lit).
  - — Verify that the SBC and NIC adapter board are connected properly.
    Note: *Make sure to turn power OFF to reconnect boards.*
  - — Verify that monitor is turned ON, power is connected to monitor, and video cable is connected to video connector on SBC.
  - — Verify that the two (or four) 72-pin memory SIMMs are connected properly on the SBC. The SIMMs must be the same brand, type, size, and speed.
  - — Disconnect all cables (except the video cable) from the SBC and NIC board, then power ON the Gatekeeper. If the Gatekeeper now has video, then there is a problem with one of the cables or one of the peripherals. Try each cable, one at a time, to isolate the bad cable or peripheral.
  - — Verify that blower fans are running. If power is on and a fan is stopped, check to be sure power connectors from power supply to midplane are fully connected and in their proper orientation, as shown on Figure TBD.
  - — If problem persists, contact MultiTech's Technical Support department (see Chapter TBD).
- **SBC does not boot correctly or hangs after video appears**
  - — Run BIOS Setup Utility to verify correct configuration for system and drives (i.e., press **DEL** key as system boots to enter BIOS Setup).
  - — If boot PROM is used, verify that network and NIC board are configured properly to see the network.
  - — Verify that SBC and NIC board are seated properly in backplane.
    Note: *Make sure to turn power off to reconnect boards.*
  - — Drive cables are not connected properly or parameters are not set properly in setup.
  - **— If a non-bootable diskette is in the floppy drive, remove it and try booting again.**
  - — Verify that enough memory is installed to load the intended applications.
  - — Verify that two (or four) 72-pin SIMMs are seated properly on the SBC. The SIMMs must be the same brand, type, size and speed.
  - — Remove NIC board. If system boots then, there was a conflict with the NIC board.

— If problem persists, contact MultiTech's Technical Support department (see Chapter 6).

- **COM1, COM2, or LPT1 port does not respond correctly**
  - — Check Setup configuration and verify that the ports are enabled.
  - — Check that cables are connected properly and peripherals are powered ON and configured properly.
  - — If problem persists, contact MultiTech's Technical Support department (see Chapter 6).
- **Keyboard does not respond to key strokes**
  - — Verify that the keyboard cable is plugged into the left round connector on the SBC.
  - — If a PS/2 keyboard adapter is used to adapt a large 5-pin DIN to a small 6-PIN PS/2 DIN connector, verify that it is not defective or the wrong type.
  - — Verify that the keyboard works properly on a different system.
  - — If problem persists, contact MultiTech's Technical Support department (see Chapter 6).
- **Gatekeeper fails during prolonged operation**
  - — A power "glitch" may have occurred.
  - — Check for overheating by verifying that all fans are operating, including two blowers in the front part of the card cage, CPU fanned-heatsink, and the power supply internal fan.
  - — Verify that air vents surrounding the chassis are not blocked.
  - — Verify that the room housing the Gatekeeper is not overly warm.
  - — Check for possible power surges from other equipment in the room and/or building.
  - — Verify that SBC and NIC board are operating reliably.
  - — Verify that there is not a buildup of dust inside the Gatekeeper.
  - — Check the event viewer in Windows NT Server for errors occurring in the system, security, or application logs.
- **Invalid Time, Date or Setup**
  - — Battery is failing.
  - — Last system boot was incomplete. Verify in Setup that configuration is correct, then reboot system.
  - — If problem persists, contact MultiTech's Technical Support department (see Chapter 6).
- **NIC Board Troubleshooting**

If you experience any problems with the NIC board, verify that the appropriate driver is loaded, the proper grade of cable is used for the network connection, and the supporting hub/switch is working properly.

1. Make sure the NIC board is fully and firmly seated in the slot connector.
2. Check the length and rating of connecting cables.
3. Make sure the NIC board's PCI slot is activated at the BIOS level. The CMOS Setup utility in PCI computers ordinarily provides the option to activate or deactivate PCI slots.

4. Replace the NIC board in question with a verified "good" unit, then repeat the diagnostic tests.

5. Install the questioned NIC board in another PCI computer and repeat the diagnostic tests on it there.

Diagnostic Tests

The Gatekeeper operates like any stand-alone PC and can run almost any off-the-shelf diagnostic program or checkpoint card. These programs are available at any software re-seller and can quickly help isolate component failures.

Troubleshooting with Error Messages

This section outlines errors that may occur during system operation and likely remedies for these problems.This section describes error messages and their use in troubleshooting. Since many errors can be caused by poor cable connections, you should first verify that all cables are connected firmly to their proper receptacles. If error messages persist after the recommended adjustments have been made, contact Multi-Tech Systems for maintenance.

Post Beep: The BIOS generates two beeping (audible) error codes.

(1) A single long beep followed by three short beeps indicates that a video error has occurred and the BIOS cannot initialize the video screen to display any additional information.

(2) A single long beep sounded repeatedly indicates that a DRAM error has occurred.

CMOS Battery Failure: If the CMOS battery is low or dead, it should be replaced. Replacement requires soldering. If the clock fails, return the SBC to Multi-Tech Systems for repair.

CMOS Checksum Error: This error indicates that the CMOS has been corrupted, possibly by a weak battery. Reconfigure the CMOS settings, then check to see if this is a continuous problem.

Disk Boot Failure: When you can't find the boot device, insert a system disk into Drive A and press < Enter >. Make sure that the controller and the cables are in their proper positions and that the hard drive has been formatted correctly. Then reboot the system. Verify the hard drive and floppy drive selections in the CMOS Setup.

Diskette Drives Or Types Mismatch Error: When the diskette drive type is different from the settings specified in CMOS (BIOS Setup), run Setup and re-configure the drive.

Error Encountered Initializing Hard Drive: If you cannot initialize the hard drive, check that the adapter has been installed correctly and that all cables are correctly and firmly attached. Also be sure the correct hard-drive type has been selected in the BIOS Setup.

Error Initializing Hard Disk Controller: When this error occurs, check to see that the cable connecting the hard drive to the motherboard is seated properly in its receptacle. Make sure the correct hard-drive type has been selected in the BIOS Setup. Also, check to see that all of the jumpers in the hard drive unit have been set correctly.

Floppy Disk Controller Error or **No Controller Present:** When you cannot find or initialize the floppy drive controller, please check that the controller settings in the BIOS Setup screen match the actual controller being used. If no floppy drives are installed in your PC, be sure the `Diskette Drive` field of the Setup screen is set to NONE.

Keyboard Error Or No Keyboard Present: When this error message appears, check to see that your keyboard is attached properly to its receptacle. Make sure JP6 is jumpered for keyboard. Also, be sure that no keys are being pressed during the booting process. If you are purposely configuring the system without a keyboard, set the error halt condition in Setup to HALT ON ALL, BUT KEYBOARD. This will cause the BIOS to ignore the missing keyboard and continue the boot.

Memory Address Error: If the memory address indicates an error, use the specified location and the memory map for your system to find and replace the bad memory chips.

Memory Verifying Error : It indicates an error verifying a value already written to memory. Try reseating the memory SIMMs or replace them one at a time.

Offending Address Missing: This message is used in connection with the I/O CHANNEL CHECK and RAM PARITY ERROR messages when the segment that has caused the problem cannot be isolated.

Reboot Error: When this error occurs, you must reboot. Press any key and the system will reboot.

System Halted: Indicates that the present boot attempt has been aborted and the system must be re-booted. Press and hold down the CTRL and ALT keys and press DEL.

Calling Technical Support

For immediate help in finding and fixing Gatekeeper problems, record the error condition and call Multi-Tech's Technical Support department (800-972-2439).

Chapter 7 Service, Warranty, and Technical Support

Introduction

This chapter starts out with statements about your Gatekeeper 2-year warranty. The next section, Tech Support, should be read carefully if you have questions or problems with your Gatekeeper. It includes the technical support phone numbers, space for recording your product information, and an explanation of how to send in your Gatekeeper should you require service. The final section explains how to receive support from the Internet.

Limited Warranty

Multi-Tech Systems, Inc., (hereafter "MTS") warrants that its products will be free from defects in material or workmanship for a period of two years from date of purchase, or if proof of purchase is not provided, two years from date of shipment.

MTS MAKES NO OTHER WARRANTY, EXPRESS OR IMPLIED, AND ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED.

This warranty does not apply to any products which have been damaged by lightning storms, water, or power surges or which have been neglected, altered, abused, used for a purpose other than the one for which they were manufactured, repaired by Customer or any party without MTS's written authorization, or used in any manner inconsistent with MTS's instructions.

MTS's entire obligation under this warranty shall be limited (at MTS's option) to repair or replacement of any products which prove to be defective within the warranty period or, at MTS's option, issuance of a refund of the purchase price. Defective products must be returned by Customer to MTS's factory — transportation prepaid.

MTS WILL NOT BE LIABLE FOR CONSEQUENTIAL DAMAGES, AND UNDER NO CIRCUMSTANCES WILL ITS LIABILITY EXCEED THE PRICE FOR DEFECTIVE PRODUCTS.

Addendum for North American Products

In the event that service is required, products can be shipped, freight prepaid, to our Mounds View, Minnesota, factory (**Multi-Tech Systems, Inc., 2205 Woodale Drive, Mounds View, MN 55112, Attn: Repairs, Serial #_____**). A Returned Materials Authorization (RMA) is not required. Return shipping charges (surface) will be paid by MTS. Please include, inside the shipping box, a description of the problem, a return shipping address (must have street address, not P.O. Box), a telephone number, and if the product is out of warranty, a check or purchase order for repair charges.

Extended two-year overnight replacement agreements are available for selected products. Please refer to our Overnight Replacement Agreement for details on rates and coverages. Please direct your questions regarding technical matters, product configuration, verification that the product is defective, etc., to our Technical Support department at **1-800-972-2439**.

Please direct your questions regarding repair expediting, receiving, shipping, billing, etc., to our Repair Accounting department at (800) 328-9717 or (763) 785-3500.

Repairs for damages caused by lightning storms, water, power surges, incorrect installation, physical abuse, or user-caused damages are billed on a time-plus-materials basis.

Addendum for International Products

Distributors should contact Amex, Inc., for information about the repairs for your Multi-Tech product.

Amex, Inc.
2724 Summer Street NE Minneapolis, MN 55413
U.S.A. Tel: (763) 331-3251
Fax: (763) 331-3180

Please direct your questions regarding technical matters, product configuration, verification that the product is defective, etc., to our Technical Support department nearest you. When calling the U.S., please direct your questions regarding repair expediting, receiving, shipping, billing, etc., to our Repair Accounting department at (763) 785-3500 in the U.S.A., or a nearby Multi-Tech office which is listed on the "Multi-Tech Corporate Offices" sheet in this International Distributor Resource Kit.

Repairs for damages caused by lightning storms, water, power surges, incorrect installation, physical abuse, or Out of Warranty Repair Costs

Refer to Multi-Tech System's Web site at http://www.multitech.com for information about out of warranty repair costs.

Service

If your tech support specialist decides that service is required, your Gatekeeper can be sent (freight prepaid) to our factory. Return shipping charges will be paid by Multi-Tech Systems.

Include the following with your Gatekeeper:

- a description of the problem
- return billing and return shipping addresses
- contact name and phone number
- check or purchase order number for payment if the Gatekeeper is out of warranty (Check with your technical support specialist for the standard repair charge for your Gatekeeper)
- if possible, note the name of the technical support specialist with whom you spoke

If you need to inquire about the status of the returned product, be prepared to provide the **serial number** of the product sent.

Send your Gatekeeper to this address:

MULTI-TECH SYSTEMS, INC.
2205 WOODALE DRIVE
MOUNDS VIEW, MINNESOTA 55112
ATTN: SERVICE OR REPAIRS

You should also check with the supplier of your Gatekeeper on the availability of local service and/or loaner units in your part of the country.

Ordering Accessories

SupplyNet, Inc. supplies replacement transformers, cables and connectors for select Multi-Tech products. You can place an order with SupplyNet via mail, phone, fax or the Internet at:

Mail: SupplyNet, Inc.
614 Corporate Way
Valley Cottage, NY 10989

Phone: 800 826-0279

Fax: 914 267-2420

Email: info@thesupplynet.com

Internet: http://www.thesupplynet.com

Tech Support

Multi-Tech has an excellent staff of technical support personnel available to help you get the most out of your Multi-Tech product. If you have any questions about the operation of this unit, call 1-800-972-2439. Please fill out the Gatekeeper information (below), and have it available when you call. If your Gatekeeper requires service, the tech support specialist will guide you on how to send in your Gatekeeper (refer to the next section).

Recording Gatekeeper Information

Please fill in the following information on your Multi-Tech Gatekeeper. This will help tech support in answering your questions. (The same information is requested on the Warranty Registration Card.)

Model No.: _____

Serial No.: _____

Software Version: _____

The model and serial numbers are on the bottom of your Gatekeeper.

Please note status of your Gatekeeper including LED indicators, screen messages, diagnostic test results, problems with a specific application, etc. Use the space below to note the Gatekeeper status:

_____

_____

_____

_____

_____

_____

About the Internet

Multi-Tech's presence includes a Web site at:

http://www.multitech.com

and an ftp site at:

ftp://ftp.multitech.com

Appendices

Appendix A - Connector Pinouts

This appendix provides specifications for the various connectors located at the back of the Gatekeeper (i.e., on the SBC board and the NIC board). Also included are the onboard connectors and jumpers on the SBC board.

SBC Connectors

VGA 15-Pin Connector

This connector, mounted on the SBC board, provides video analog data and horizontal and vertical synchronization signals for VGA monitors.

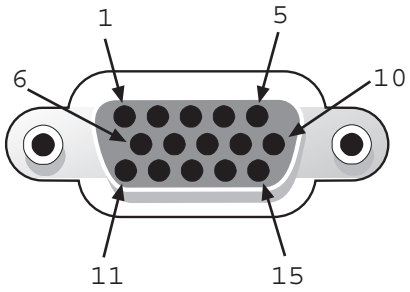


Figure A-1. 15-Pin VGA Connector

Pin Identification

Pin	Description
1	Analog Red
2	Analog Green
3	Analog Blue
4	VESA Monitor Status Bit 2
5	Digital Ground
6	Digital Ground
7	Digital Ground
8	Digital Ground
9	NC
10	Digital Ground
11	VESA Monitor Status Bit 0
12	VESA Monitor Status Bit 1
13	Horizontal Sync
14	Vertical Sync
15	NC

9-Pin DB9 (COM 1) Connector

This connector, also mounted on the SBC board, provides its COM 1 serial port connection, which is generally used to connect a mouse to the SBC board.

The same type connector, mounted on an adapter and cabled to the SBC board, is used for COM 2 in this system.

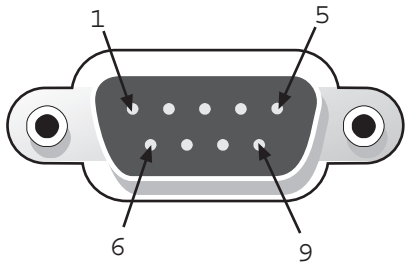


Figure A-2. 9-Pin DB9 COM 1 (or COM 2) Connector

Pin Identification

Pin	Description
1	DCD
2	RX Data
3	TX Data
4	DTR
5	Ground
6	DSR
7	RTS
8	CTS
9	RI

6-Pin Circular Jack

This connector is used to connect the keyboard to the SBC board.

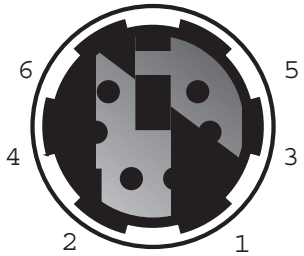


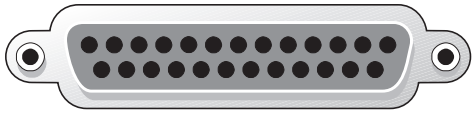
Figure A-3. 6-Pin Mini-DIN Keyboard Connector

Pin Identification

Pin	Description
1	+Keyboard Data
2	NC
3	GND
4	+5V DC
5	+Keyboard Clock
6	NC

25-Pin DB25 (LPT 1) Connector

This female connector, mounted on an adapter and cabled to the SBC board, is used for parallel port LPT 1 (i.e., printer port) in this system.



Note: Top row (left to right) = Pins 1 - 13; bottom row = 14 - 25.

Figure A-4. 25-Pin DB25 LPT1 Parallel (Printer) Connector

Pin Identification

Pin	Description
1	-Strobe
2	+Data Bit 0
3	+Data Bit 1
4	+Data Bit 2
5	+Data Bit 3
6	+Data Bit 4
7	+Data Bit 5
8	+Data Bit 6
9	+Data Bit 7
10	-Acknowledge
11	+Busy
12	+Paper End
13	+Select
14	-Auto Feed
15	- Error
16	-Initialize Printer
17	-Select Input
18	Ground
19	Ground
20	Ground
21	Ground
22	Ground
23	Ground
24	Ground
25	Ground

NIC Board Connector

RJ-45 Connector

This connector ties the NIC board to a 10BaseT network.

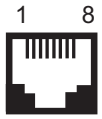


Figure A-5. RJ-45 Connector (viewed from connector side)

Pin Identification

Pin	Description
1	+ Transmit Data
2	- Transmit Data
3	+ Receive Data
4	No Connect
5	No Connect
6	-Receive Data
7	No Connect
8	No Connect

SBC Onboard Connectors

Figure A-6 displays component locations on the SBC board.

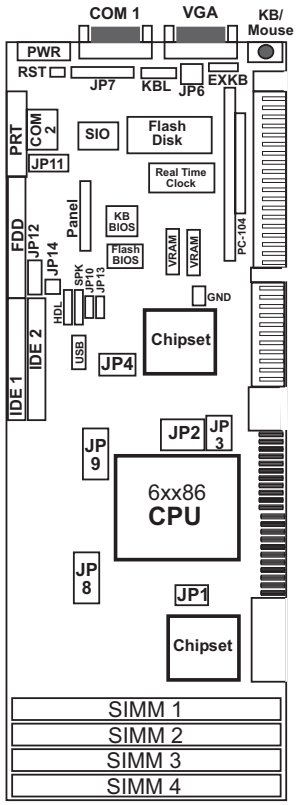


Figure A-6. Connector, Jumper and Component Locations on the SBC Board

##?## begin insert ##?##

34-Pin Floppy Disk Drive Connector

This connector provides signal and data connection between the floppy drive and the SBC board.

Figure A-7. Floppy Disk Connector

Pin	Description	Pin	Description
1	Ground	18	Direction (Stepper Motor)
2	RPM/RWC	19	Ground
3	Ground	20	Step Pulse
4	Not Used	21	Ground
5	Ground	22	Write Data
6	Not Used	23	Ground
7	Ground	24	Write Enable
8	Index	25	Ground
9	Ground	26	Track 0
10	Motor Enable 1	27	Ground
11	Ground	28	Write Protect
12	Drive Select 2	29	Ground
13	Ground	30	Read Data
14	Drive Select 1	31	Ground
15	Ground	32	Select Head
16	Motor Enable 2	33	Ground
17	Ground	34	/DCHNG

Printer Port Connector

This 25-pin connector provides parallel printer data and control signals to and from the SBC board.

Figure A-8. Printer Port Connector

Pin	Description	Pin	Description
1	-Strobe	10	-Acknowledge
2	+Data Bit 0	11	+Busy
3	+Data Bit 1	12	+Paper End
4	+Data Bit 2	13	+Select
5	+Data Bit 3	14	-Auto Feed
6	+Data Bit 4	15	-Error
7	+Data Bit 5	16	-Initialize Printer
8	+Data Bit 6	17	-Select Input
9	+Data Bit 7	18-25	Ground

COM 2 Port Connector

This 10-pin connector transfers serial data to and from the COM 2 port.

Figure A-9. COM 2 Port Connector

PinSignal	Name (Direction)
1	Carrier Detect (Input)
2	Data Set Ready (Input)
3	Receive Data (Input)
4	Request To Send (Output)
5	Transmit Data (Output)
6	Clear To Send (Input)
7	Data Terminal Ready (Output)
8	Ring Indicator
9	Signal Ground
10	Unused

Hard Disk Connector

This connector supplies hard disk drive signals which interface with the software I/O drivers to provide the read/write functions.

Figure A-10. Hard Disk Connector

Pin	Description	Pin	Description
1	/Reset	21	NC
2	Ground (GND)	22	Ground (GND)
3	Data Bit 7 (SD7)	23	-I/O Write (-IOW)
4	Data Bit 8 (SD8)	24	Ground (GND)
5	Data Bit 6 (SD6)	25	-I/O Read (-IOR)
6	Data Bit 9 (SD9)	26	Ground (GND)
7	Data Bit 5 (SD5)	27	IOCHRDY
8	Data Bit 10 (SD10)	28	ALE\
9	Data Bit 4 (SD4)	29	NC
10	Data Bit 11 (SD11)	30	Ground (GND)
11	Data Bit 3 (SD3)	31	IRQ14
12	Data Bit 12 (SD12)	32	/IOCS16
13	Data Bit 2 (SD2)	33	Address Bit 1 (SA1)
14	Data Bit 13 (SD13)	34	NC
15	Data Bit 1 (SD1)	35	Address Bit 0 (SA0)
16	Data Bit 14 (SD14)	36	Address Bit 2 (SA2)
17	Data Bit 0 (SD0)	37	Chip Select 0 (-CS0)
18	Data Bit 15 (SD15)	38	Chip Select 1 (-CS1)
19	Ground (GND)	39	/HDLED
20	NC	40	Ground (GND)

##?## end insert ##?##

COM2 Connector

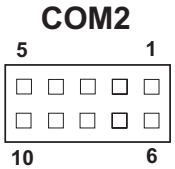


Figure A-11. COM2 Connector

The COM2 Connector assignments are as follows:

PIN	SIGNAL FUNCTION		
	RS-232	RS-422	RS-485
1	DCD	TX-	DATA-
2	RX	TX+	DATA+
3	TX	RX+	NC
4	DTR	RX-	NC
5	GND	GND	GND
6	DSR	RTS-	NC
7	RTS	RTS+	NC
8	CTS	CTS+	NC
9	RI	CTS-	NC
10	NC	NC	NC

External Keyboard Connector

EXKB : external keyboard connector

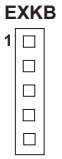


Figure A-12. External Keyboard Connector

The pin assignments are as follows:

PIN	SIGNAL FUNCTION
1	KBCLK
2	KBDATA
3	NC
4	GND
5	Vcc

Reset Connector

Figure A-13. Reset Connector

JP10 : Reset Connector.

The pin assignments are as follows:

PIN	SIGNAL FUNCTION
1	Reset
2	Ground

Floppy Disk Drive Connector

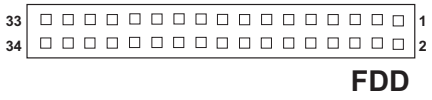


Figure A-14. Floppy Disk Drive Connector

FDD : Floppy Disk Drive Connector

The pin assignments are as follows:

PIN	SIGNAL F'N	PIN	SIGNAL FUNCTION
1	GND	2	RPM
3	GND	4	NC
5	GND	6	RATE0
7	GND	8	INDEX
9	GND	10	MTR0
11	GND	12	DRV1
13	GND	14	DRV0
15	GND	16	MTR1
17	GND	18	DIR
19	GND	20	STEP
21	GND	22	WDATA
23	GND	24	WGATE
25	GND	26	TRK0
27	GND	28	WRPRT
29	GND	30	RDATA
31	GND	32	SEL
33	GND	34	DSKCHG

Hard drive Connector

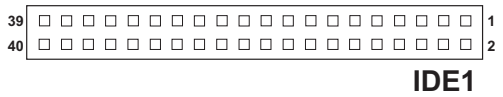


Figure A-15. Hard drive Connector for IDE1

IDE1: Hard drive Connector

The Gatekeeper has two HDD connectors, IDE1 and IDE2. The pin assignments are as follows:

PIN	SIGNAL FUNCTION	PIN	SIGNAL FUNCTION
1	IDERST	21	IDEREQ0
2	GND	22	GND
3	IDED7	23	IDEIOW
4	IDED8	24	GND
5	IDED6	25	IDEIOR
6	IDED9	26	GND
7	IDED5	27	IDERDY
8	IDED10	28	PULL HI
9	IDED4	29	IDEACK0
10	IDED11	30	GND
11	IDED3	31	IRQ14
12	IDED12	32	IOCS16
13	IDED2	33	IDEA1
14	IDED13	34	GND
15	IDED1	35	IDEA0
16	IDED14	36	IDEA2
17	IDED0	37	IDECS1P
18	IDED15	38	IDECS3P
19	GND	39	IDELEDP
20	N.C.	40	GND

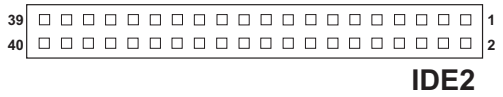


Figure A-16. Hard drive Connector for IDE2

IDE2: Hard drive Connector

The pin assignments are as follows:

PIN	SIGNAL F'N	PIN	SIGNAL FUNCTION
1	IDERST	21	IDEREQ1
2	GND	22	GND
3	IDED7	23	IDEIOW
4	IDED8	24	GND
5	IDED6	25	IDEIOR
6	IDED9	26	GND
7	IDED5	27	IDERDY
8	IDED10	28	PULL HI
9	IDED4	29	IDEACK1
10	IDED11	30	GND
11	IDED3	31	IDESIRQ
12	IDED12	32	IOCS16
13	IDED2	33	IDEA1
14	IDED13	34	GND
15	IDED1	35	IDEA0

16	IDED14	36	IDEA2
17	IDED0	37	IDECS1S
18	IDED15	38	IDECS3S
19	GND	39	IDELEDS
20	N.C.	40	GND

Hard drive LED Connector

Figure A-17. Hard Drive LED Connector

HDL : Hard driver LED Connector (on Motherboard)

The pin assignments are as follows:

PIN	SIGNAL FUNCTION
1	Vcc
2	HDD Active Signal
3	HDD Active Signal
4	Vcc

Power LED & Keylock Connector

Figure A-18. Power LED and Keylock Connector

KBL : Power LED & keylock Connector (on Motherboard)

The pin assignments are as follows:

PIN	SIGNAL FUNCTION
1	Power LED
2	NC
3	Ground
4	Keyboard INT
5	Ground

5	GND	13	HSYNC
6	GND	14	VSYNC
7	GND	15	NC
8	GND		

Power Connector

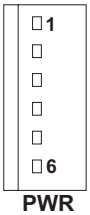


Figure A-19. Power Connector

PWR : Power Connector

The pin assignments are as follow :

PIN	SIGNAL FUNCTION
1	NC
2	+5V
3	+12V
4	-12V
5	GND
6	GND

Printer Connector

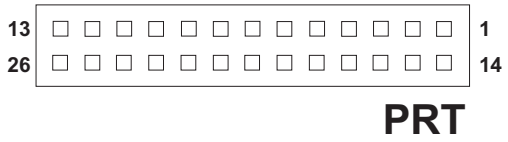


Figure A-20. Printer Connector

PRT : Printer Connector

As to link the Printer to the card, you need a cable to connect both DB25 connector and parallel port. The pin assignments are as follows:

PIN	SIGNAL F'N	PIN	SIGNAL FUNCTION
1	STB	14	AUTFE
2	P0	15	ERROR
3	P1	16	INIT
4	P2	17	SLCTIN
5	P3	18	GND
6	P4	19	GND
7	P5	20	GND
8	P6	21	GND
9	P7	22	GND
10	ACK	23	GND
11	BUSY	24	GND
12	PE	25	GND
13	SLCT	26	NC

External Speaker Connector

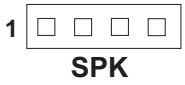


Figure A-21. External Speaker Connector

SPK : External Speaker Connector

The pin assignments are as follows:

PIN	SIGNAL FUNCTION
1	Vcc
2	Ground
3	NC
4	Speaker Signal

Expansion Slots

This appendix presents the pin assignments for the PC-104 connector, the ISA bus, and the PCI bus.

PC-104 CONNECTOR PIN ASSIGNMENT

104AB, 104CD : PC-104 Connector

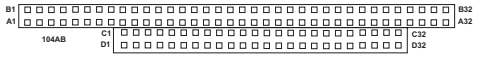


Figure A-22. PC104 Connector

The PC-104 can support multiple PC-104 modules. This card has two connectors : one (104AB) consists of 64 pins; the other one (104CD) consists of 40 pins, both are dual-in-line headers.

The pin assignments for connectors 104AB & 104CD are as follows:

104AB				104CD			
Pin	Assignment	*Pin*	*Assignment*	Pin	Assignment	*Pin*	*Assignment*
A1	IOCHK	B1	GND	C1	GND	D1	GND
A2	D7	B2	RESET	C2	SBHE	D2	MEMCS16
A3	D6	B3	VCC	C3	LA23	D3	IOCS16
A4	D5	B4	IRQ9	C4	LA22	D4	IRQ10
A5	D4	B5	-5V	C5	LA21	D5	IRQ11
A6	D3	B6	DRQ2	C6	LA20	D6	IRQ12
A7	D2	B7	-12V	C7	LA19	D7	IRQ15
A8	D1	B8	OWS	C8	LA18	D8	IRQ14
A9	D0	B9	+12V	C9	LA17	D9	DACK0
A10	iOCHRDY	B10	GND	C10	MEMR	D10	DRQ0
A11	AEN	B11	SMEMW	C11	MEMW	D11	DACK5
A12	A19	B12	SMEMR	C12	D8	D12	DRQ5
A13	A18	B13	IOW	C13	D9	D13	DACK6
A14	A17	B14	IOR	C14	D10	D14	DRQ6
A15	A16	B15	DACK3	C15	D11	D15	DACK7
A16	A15	B16	DRQ3	C16	D12	D16	DRQ7
A17	A14	B17	DACK1	C17	D13	D17	+5V
A18	A13	B18	DRQ1	C18	D14	D18	MASTER
A19	A12	B19	REFRESH	C19	D15	D19	GND
A20	A11	B20	CLK	C20	KEY PIN	D20	GND
A21	A10	B21	IRQ7				
A22	A9	B22	IRQ6				
A23	A8	B23	IRQ5				
A24	A7	B24	IRQ4				
A25	A6	B25	IRQ3				
A26	A5	B26	DACK2				
A27	A4	B27	T/C				
A28	A3	B28	BALE				
A29	A2	B29	VCC				
A30	A1	B30	OSC				
A31	A0	B31	GND				
A32	GND	B32	GND				

Figure A-23. PC-104 Pin Assignments

ISA Bus Pin Assignments

There are two edge connectors on this CPU Card. The one closest to the edge bracket is the ISA bus connector; the other is the PCI bus connector. The ISA-bus connector is divided into two sets : one consists of 62 pins; the other consists of 36 pins.

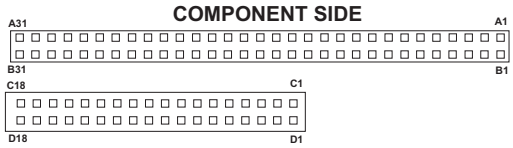


Figure A-24. ISA Bus Connector

The pin assignments are as follows:

Pin	*Assignment*	Pin	Assignment	*Pin*	*Assignment*	Pin	Assignment
B1	GND	A1	-IOCHK	D1	-MEMCS16	C1	SBHE
B2	RESET	A2	SD07	D2	-IOCS16	C2	LA23
B3	VCC	A3	SD06	D3	IRQ10	C3	LA22
B4	IRQ9	A4	SD05	D4	IRQ11	C4	LA21
B5	-5V	A5	SD04	D5	IRQ12	C5	LA20
B6	DRQ2	A6	SD03	D6	IRQ15	C6	LA19
B7	-12V	A7	SD02	D7	IRQ14	C7	LA18
B8	OWS	A8	SD01	D8	-DACK0	C8	LA17
B9	+12V	A9	SD00	D9	DRQ0	C9	MEMR
B10	GND	A10	-IOCHRDY	D10	-DACK5	C10	MEMW
B11	-SMEMW	A11	AEN	D11	DRQ5	C11	SD08
B12	-SMEMR	A12	SA19	D12	-DACK6	C12	SD09
B13	-IOW	A13	SA18	D13	DRQ6	C13	SD10
B14	-IOR	A14	SA17	D14	-DACK7	C14	SD11
B15	-DACK3	A15	SA16	D15	DRQ7	C15	SD12
B16	-DRQ3	A16	SA15	D16	+5V	C16	SD13
B17	-DACK1	A17	SA14	D17	-MASTER	C17	SD14
B18	-DRQ1	A18	SA13	D18	GND	C18	SD15
B19	-REFRESH	A19	SA12				
B20	BCLK	A20	SA11				
B21	IRQ7	A21	SA10				
B22	IRQ6	A22	SA09				
B23	IRQ5	A23	SA08				
B24	IRQ4	A24	SA07				
B25	IRQ3	A25	SA06				
B26	-DACK2	A26	SA05				
B27	T/C	A27	SA04				
B28	BALE	A28	SA03				
B29	+5V	A29	SA02				
B30	OSC	A30	SA01				
B31	GND	A31	SA00				

Figure A-25. ISA Bus Pin Assignments

PCI Bus Pin Assignments

Like the ISA-BUS connector, the PCI-BUS edge connector is also divided into two parts: one consists of 98 pins; the other consists of 22 pins. The standard of PCI-MG 32-bit PCI-ISA connector contains 218 pins in total.

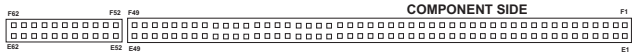


Figure A-26. PCI Bus Connector

The pin assignments are as follows:

F		E		F		E	
Pin	Assignment	Pin	Assignment	Pin	Assignment	Pin	Assignment
F1	-12V	E1	TRST#	F31	+3.3V	E31	AD18
F2	TCK	E2	+12V	F32	AD17	E32	AD16
F3	GND	E3	TMS	F33	C/BE2#	E33	+3.3V
F4	TDO	E4	TDI	F34	GND	E34	FRAME#
F5	+5V	E5	+5V	F35	IRDY#	E35	GND
F6	+5V	E6	INTA#	F36	+3.3V	E36	TRDY#
F7	INTB#	E7	INTC#	F37	DEVSEL#	E37	GND
F8	INTD#	E8	+5V	F38	GND	E38	STOP#
F9	REQ3#	E9	CLKC	F39	LOCK#	E39	+3.3V
F10	REQ1#	E10	+5V(I/O)	F40	PERR#	E40	SDONE
F11	GNT3#	E11	CLKD	F41	+3.3V	E41	SB0#
F12	GND	E12	GND	F42	SERR#	E42	GND
F13	GND	E13	GND	F43	+3.3V	E43	PAR
F14	CLKA	E14	GNT1#	F44	C/BE1#	E44	AD15
F15	GND	E15	RST#	F45	AD14	E45	+3.3V
F16	CLKB	E16	+5V(I/O)	F46	GND	E46	AD13
F17	GND	E17	GNT0#	F47	AD12	E47	AD11
F18	REQ0#	E18	GND	F48	AD10	E48	GND
F19	+5V(I/O)	E19	REQ2#	F49	GND	E49	AD09
F20	AD31	E20	AD30	F52	AD08	E52	C/BE0#
F21	AD29	E21	+3.3V	F53	AD07	E53	+3.3V
F22	GND	E22	AD28	F54	+3.3V	E54	AD06
F23	AD27	E23	AD26	F55	AD05	E55	AD04
F24	AD25	E24	GND	F56	AD03	E56	GND
F25	+3.3V	E25	AD24	F57	GND	E57	AD02
F26	C/BE3#	E26	GNT2#	F58	AD01	E58	AD00
F27	AD23	E27	+3.3V	F59	+5V(I/O)	E59	+5V(I/O)
F28	GND	E28	AD22	F60	ACK64#	E60	REQ64#
F29	AD21	E29	AD20	F61	+5V	E61	+5V
F30	AD19	E30	GND	F62	+5V	E62	+5V

Figure A-27. PCI Pin Assignments

How to Set Jumpers

Jumpers and Caps. Your PC is configured by the positions of jumpers on the circuit board. A jumper consists of two or more metal pins with a plastic base mounted on the card. A small plastic "cap" (with a metal contact inside) is used to connect the pins. For two-pin jumpers, the active value for user-changeable parameters depends on jumper pins being closed (electrically connected by a cap) or open (not electrically connected). For parameters having more than two values, groups of jumpers (or "jumper blocks") are used to determine the active value. For example, if a jumper has three pins labeled PIN1, PIN2, and PIN3, you can use a jumper cap to connect PIN1 & PIN2 to activate one value for the parameter. Connecting PIN2 and PIN3 would activate another value.

This manual contains many illustrations of jumper configurations. Jumper caps are depicted as shaded boxes connecting pairs of pins on jumper blocks

Jumper Settings

The SBC is equipped with a 233 MHz Pentium CPU with MMX. Its JP7 jumper settings for RS-422 and RS-485 are shown below.

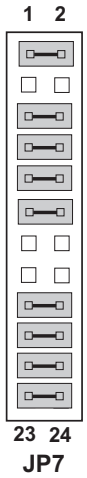


Figure A-28. RS-422 at COM2

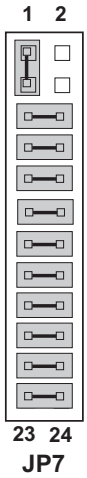


Figure A-29. RS-485 at COM2

*** Factory default = RS-232 (no jumpers).

AT Keyboard / PS2 Mouse Selection

JP6 : AT keyboard / PS2 mouse selection

The jumper settings are as follows:

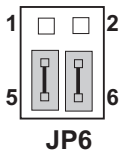
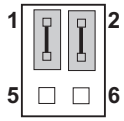


Figure A-30. AT Keyboard Jumper (Default)



Note: Jumpers JP8 and JP9 are used to set the CPU core voltage.

CPU TYPE & CLOCK SELECTION

JP2 : Bus Frequency Ratio Selection
JP4 : CPU Clock Selection +

Figure A-31. PS2 Mouse Jumper

Appendix B - SBC Mapping Parameters

This appendix presents mappings of six parameter sets:

Interrupts

RTC & CMOS RAM Assignments

Timer Channels

DMA Channels

Memory Functions

Input/Output Functions

Table B-1. Interrupt Map

IRQ	Assignment
0	System TIMER interrupt from Timer-0
1	Keyboard output buffer full
2	Cascade for IRQ 8-15
3	Serial Port 2
4	Serial Port 1
5	Parallel Port 2
6	Floppy Disk Adapter
7	Parallel Port 1
8	RTC Clock
9	Available
10	Available
11	Available
12	Available
13	Math Co-Processor
14	Hard Disk Adapter
15	Available

Table B-2. RTC & CMOS Map

Code	Assignment
00	Seconds
01	Second Alarm
02	Minutes
03	Minute Alarm
04	Hours
05	Hours Alarm
06	Day of Week
07	Day of Month
08	Month
09	Year
0A	Status Register A
0B	Status Register B
0C	Status Register C
0D	Status Register D
0E	Diagnostic Status Byte
0F	Shutdown Byte
10	Floppy Disk Drive Type Byte
11	Reserved
12	Hard Disk Drive Type Byte
13	Reserved
14	Equipment Byte
15	Base Memory Low Byte
16	Base Memory High Byte
17	Extension Memory Low Byte
18	Extension Memory High Byte
30	Reserved for Extension Memory Low Byte
31	Reserved for Extension Memory High Byte
32	Date Century Byte
33	Information Flag
34-3F	Reserved
40-7F	Reserved for Chipset Setting Data

Table B-3. Timer Channels Map

Timer Channel	Assignment
0	System Timer Interrupt
1	DRAM Refresh Request
2	Speaker Tone Generator

Table B-4. DMA Channels Map

DMA Channel	Assignment
0	Available
1	IBM SDLC
2	Floppy Disk Adapter
3	Channel 3; available
4	Cascade for DMA Controller 1
5	Available
6	Available
7	Available

Table B-5. Memory Map

Memory Map	Assignment
0000000-009FFFF	System memory used by DOS and application.
00A0000-00BFFFF	Display buffer memory for VGA/EGA/CGA/ monochrome adapter.
00E0000-00EFFFF	Reserved for PCI device ROM
00F0000-00FFFFF	System BIOS ROM
0100000-FFFFFFF	System extension memory

Table B-6. I/O Map

I/O Map	Assignment
000-01F	DMA Controller (Master)
020-021	Interrupt Controller (Master)
022-023	Chipset Controller: Registers, I/O Ports
040-05F	Timer Control Registers
060-06F	Keyboard Interface Controller (8042)
070-07F	RTC Ports & CMOS I/O Ports
080-09F	DMA Register
0A0-0BF	Interrupt Controller (slave)
0C0-0DF	DMA Controller (slave)
0F0-0FF	Math Co-Processor
1F0-1F8	Hard Disk Controller
278-27F	Parallel Port 2
2B0-2DF	Graphics Adapter Controller
2F8-2FF	Serial Port 2
360-36F	Network Ports
378-37F	Parallel Port 1
3B0-3BF	Monochrome & Printer Adapter
3C0-3CF	EGA Adapter
3D0-3DF	CGA Adapter
3F0-3F7	Floppy Disk Controller
3F8-3FF	Serial Port 1

Appendix C - SBC Configuration Details

Flash BIOS Update

BIOS updates are revised versions of the BIOS that have been modified to remedy known bugs. When necessary, use the program "Awdflash.exe" on your System CD-ROM to update the system BIOS and the VGA BIOS. Check periodically with MultiTech to see if a new flash BIOS update is available.

Watchdog Timer Configuration

The watchdog timer does not run constantly. It must be started in DOS Debug mode or from another application program, customized for this purpose, that runs on the system. The watchdog timer is especially useful for remote rebooting of the PC.

The watchdog timer is defined at I/O port **0443H**. To enable the watchdog timer, write I/O port **0443H**, then the system will reset itself. To disable the function, write I/O port **0441H** and the system will stop the Watchdog timer.

Since the timer's intervals have a tolerance of 25%, you should specify that the timer be refreshed about once every second. To program your watchdog timer, follow these steps:

Watchdog enable program:

```
MOV     AX, 000FH     (choose the values you need; start from 0)
MOV     DX, 0443H
OUT     DX, AX
```

Watchdog disable program:

```
MOV     AX, 000FH     (this value can be ignored)
MOV     DX, 0441H
OUT     DX, AX
```

The Watchdog Timer control table is as follows:

Level	Value	Time/sec	Level	Value	Times/sec
1	F	0	9	7	16
2	E	2	10	6	18
3	D	4	11	5	20
4	C	6	12	4	22
5	B	8	13	3	24
6	A	10	14	2	26
7	9	12	15	1	28
8	8	14	16	0	30

Green PC Function

The Gatekeeper is equipped with a "green function" that enables it to operate using reduced electrical power when the machine is inactive. When in green mode, the Gatekeeper slows down and shuts down certain computer functions in order to reduce power consumption. There are three reduced-power operating modes (presented in order of increasing power savings):

(1) CPU Doze Mode,
(2) System Standby Mode,
(3) System Suspend Mode .

By default, however, the green function is turned off.

Power Saving Block Diagram

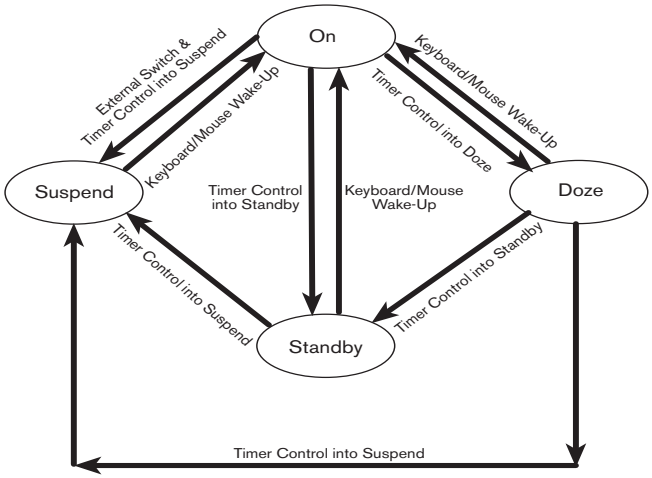


Figure C-1: "Power On" & Three Reduced-Power States

CPU Doze Mode

1. After a pre-determined period of inactivity has elapsed, the CPU will slow to 8 MHz.

2. The computer will emit one 'beep' sound.

3. The green function will monitor PC activity according to the settings on the Power Management Setup screen.

4. As soon as any activity occurs, the system will switch from "Doze Mode" to "On Mode."

System Standby Mode

1. After a predetermined period of inactivity has elapsed, the CPU will slow to 8 MHz.

2. The computer will emit two beeps.

3. The Level 1 cache will be disabled.

4. The VGA monitor will display a blank screen.

5. The hard drive will be powered down.

6. As soon as any activity occurs, the system will switch from "Doze Mode" to "On Mode."

System Suspend Mode

1. After a pre-determined period of inactivity has elapsed, the CPU will slow to 8 MHz.

2. The computer will emit three beeps.

3. The Level 2 cache will be disabled.

4. The VGA monitor will display a blank screen.

5. The hard drive will be powered down.

6. The green function will monitor PC activity according to the settings on the Power Management Setup screen.

7. When the system is in Suspend Mode, input from the keyboard, or the mouse, or alarm is required to wake up the PC.

Award BIOS Setup

This chapter describes how the BIOS manages the features of your system and explains how to configure the BIOS in its Setup Menu. The IPC-551 single-board computer is equipped with a system BIOS chipset from Award Software Inc.

Your application programs (such as word processing, spreadsheets, and games) rely on an operating system such as DOS or OS/2 to manage such things as keyboard, monitor, disk drives, and memory.

The operating system, in turn, relies on a BIOS (Basic Input and Output system), a program stored on a ROM (Read-only Memory) chip, to initialize and configure your computer's hardware. As the interface between the hardware and the operating system, the BIOS enables you to make basic changes to your system's hardware without having to write a new operating system.

The following diagram illustrates the interlocking relationships between the system hardware, BIOS, operating system, and an application program:

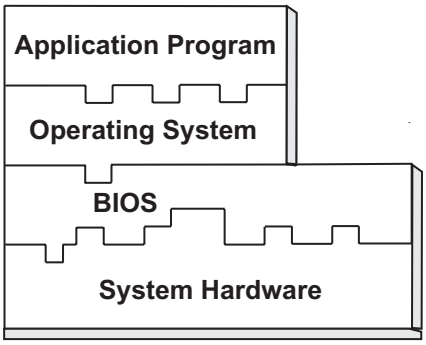


Figure C-2. PC Subsystem Relationships

The Setup program built into the Award BIOS lets users modify the basic system configuration. This special configuration information is then stored in battery-backed RAM so that the PC retains the Setup information when the power is turned off.

The Award BIOS is a custom version of an industry standard BIOS. It supports Intel/Cyrix/AMD processors in a standard IBM-AT compatible input/output system. The BIOS provides critical low-level support for standard devices such as disk drives and serial and parallel ports.

The Award BIOS has been customized by adding important, but non-standard, features such as virus and password protection as well as special support for detailed fine-tuning of the chipset that controls the entire PC system.

Descriptions in this chapter will help you configure your system using the BIOS Setup screens.

Note: MultiTech has pre-set the BIOS before shipping the Gatekeeper. In most cases, the user will not need to change any BIOS settings. However, if any hardware within the Gatekeeper has been changed, or if the boot sequence has been changed, the user will need to revise the BIOS accordingly.

Entering Setup

To enter the BIOS Setup screen, power on the computer and then press the Delete key immediately. The other way to enter Setup is to power on the computer and then, when the below message appears briefly at the bottom of the screen during the POST (Power On Self Test), press the Delete key or simultaneously press <Ctrl>, < Alt >, and < Esc > keys (Control, Alternate, & Escape).

TO ENTER SETUP BEFORE BOOT PRESS <CTRL-ALT-ESC> OR <DEL> KEY

As long as the above message is present on the screen you may press the <Del> key (the one that shares the decimal point at bottom of the number keypad) to access the Setup program. After a moment, the main menu of the Award SETUP program will appear on the screen:

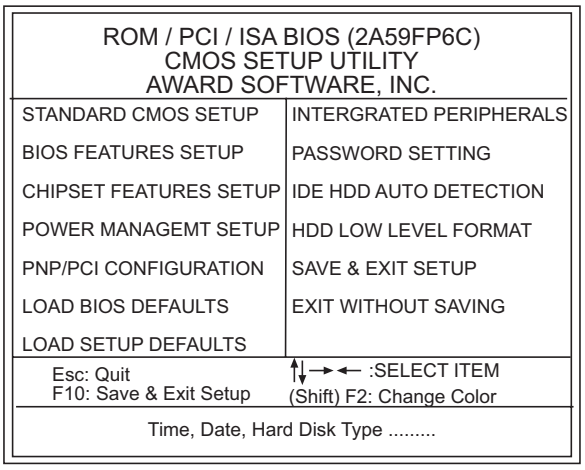


Figure C-3. Setup Program Initial Screen

Setup Keyboard Commands

A common set of keyboard commands is used for all BIOS-related screens. For example, you may use the cursor up/down keys to highlight the individual menu items. As you highlight each item, a brief description of that item's function will appear in the lower window. If you have a color monitor you can use the Shift F2 keys to scroll through the various color combinations available.

In general, you use the arrow keys to highlight items and then press Enter to select. Use the PageUp and PageDown keys to change entries. Press F1 for help. Press Esc to quit. The following table provides more detail about how to navigate in the Setup program using the keyboard.

Up arrow	Move to previous item
Down arrow	Move to next item
Left arrow	Move to the item in the left hand
Right arrow	Move to the item in the right hand
Esc key	Main Menu — Quit but do not save changes into CMOS
Submenu	Exit current page and return to Main Menu
PgUp key	Increase the numeric value or make changes
PgDn key	Decrease the numeric value or make changes
+ key	Increase the numeric value or make changes
- key	Decrease the numeric value or make changes
F1 key	General help

(Shift)F2	Change color from total 16 colors. F2 selects key color forward; Shift-F2 selects color backwards.
F4 key	Reserved
F5 key	Restore the previous CMOS value from CMOS
F6 key	Load the default CMOS value from BIOS default table
F7 key	Load the default value of the parameter
F8 key, F9 key	Reserved
F10 key	Save all the CMOS changes, only for Main Menu

The Standard CMOS Setup Menu

Highlight STANDARD CMOS SETUP and press < ENTER >. The following screen display will appear:

Memory Installation

The IPC-551 Pentium Embedded Computer will support two double DRAM banks, bank 0 and bank 1, each consisting of two 72-pin SIMM sockets.

Note: *SIMM 1,2,3,4 for double-bank DRAM module (72pin x 32bit x 4).*

DRAM BANK CONFIGURATION

SIMM 1	SIMM 2	SIMM 3	SIMM 4	TOTAL
BANK 0		BANK 1		MEMORY
4M	4M			8M
4M	4M	4M	4M	16M
8M	8M			16M
8M	8M	4M	4M	24M
8M	8M	8M	8M	32M
16M	16M			32M
16M	16M	4M	4M	40M
16M	16M	8M	8M	48M
16M	16M	16M	16M	64M
32M	32M			64M
32M	32M	4M	4M	72M
32M	32M	8M	8M	80M
32M	32M	16M	16M	96M
32M	32M	32M	32M	128M
64M	64M			128M
64M	64M	4M	4M	136M
64M	64M	8M	8M	144M
64M	64M	16M	16M	160M
64M	64M	32M	32M	192M
64M	64M	64M	64M	256M
128M	128M			256M

SBC Configuration

This section presents detailed information on VGA video mode and the " Watchdog" function. It also describes how to install configurations.

Sections include:

VGA Drivers Utilities

Flash BIOS Update

Watchdog Timer Configuration

VGA Driver Utilities

VGA Drivers

The VGA interface for the SBC supports a wide range of display modes, such as SVGA, STN, TFT, EL,.etc.

This single-board computer is shipped with a CD-ROM containing two files, VGA.EXE and AWDFLASH.EXE, for VGA driver setup and Flash BIOS update.

..... 1. Awdflash 5.35A program update for Awardflash BIOS

..... 3. Win95 program for Win95 system

..... 4. WinNT 3.5x program for WinNT3.5x

..... 5. WinNT 4.0 program for WinNT4.0

..... 6. Win 2000 program for Win 2000 system

.....7. OS/2 Video Device Driver for OS/2 3.0 system

Before you change any setup for VGA or system BIOS, you must first install your utility CD-ROM. Then the file will automatically be decompressed ('unzipped') and a sub-directory will be created on your hard drive.

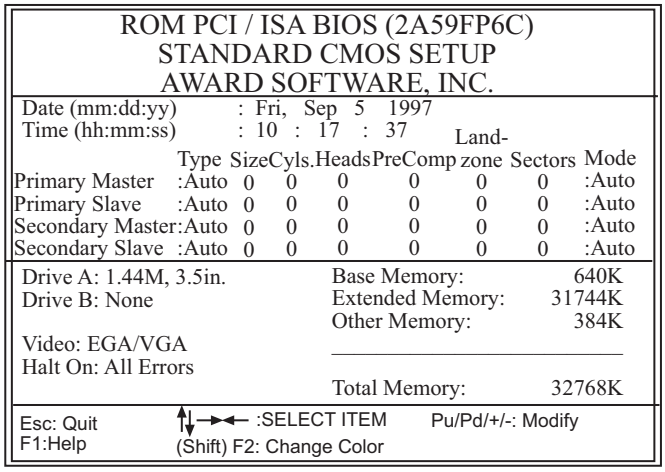

ROM PCI / ISA BIOS (2A59FP6C)
STANDARD CMOS SETUP
AWARD SOFTWARE, INC.
Date (mm:dd:yy) : Fri, Sep 5 1997
Time (hh:mm:ss) : 10 : 17 : 37
Type Size Cyls. Heads PreComp Land-zone Sectors Mode
Primary Master :Auto 0 0 0 0 0 0 :Auto
Primary Slave :Auto 0 0 0 0 0 0 :Auto
Secondary Master:Auto 0 0 0 0 0 0 :Auto
Secondary Slave :Auto 0 0 0 0 0 0 :Auto
Drive A: 1.44M, 3.5in.
Drive B: None
Video: EGA/VGA
Halt On: All Errors
Base Memory: 640K
Extended Memory: 31744K
Other Memory: 384K
Total Memory: 32768K
Esc: Quit
F1:Help
:SELECT ITEM
Pu/Pd/+/-: Modify
(Shift) F2: Change Color

Figure C-4. Standard CMOS Setup Screen

The base memory size and the extended memory size are displayed in the above table. This is automatically read from your system. You do not need to set these parameters. The screen displays the date and time, which the operator must set correctly after powering up the computer. The format of the date/time display is as follows:

Date:

< Month >, < Date > and <Year >. Ranges for each value are on the CMOS Setup Screen, and the week-day will be skipped automatically.

Time:

< Hour >, < Minute >, and < Second >. Use 24 hour clock format, i.e., for "p.m." numbers, add 12 to the hour. For example, 4:30 p.m. should be expressed as 16:30:00.

Drives: Primary Master/Slave & Secondary Master/Slave

In general, the SBC can handle four disk drives: a primary master, a primary slave, a secondary master, and a secondary slave. The hard drive shipped with the Gatekeeper is a "Primary Master" drive designated as Drive C. An IDE CDROM is supplied and functions as a Primary Slave drive and is designated as Drive D. The "type" and "mode" settings for the primary master and the primary slave drives should, in most cases, be AUTO.

When this field of the Standard CMOS Setup screen is set to AUTO, the SBC will automatically detect the hard drive(s) in the system. The SBC can auto-detect 45 specific drive types (designated 1-45 in this field).

The drive type can also be entered manually. If entered manually, the drive in use must match the type entered in this field. If the drive being used is not of the type specified in this field, it will not work properly in the Gatekeeper. For drives not on the list of 45 types, a user-defined drive can also be specified in this field (as type "User"). When "User" is selected for this field, the operator needs to specify the parameters of the hard drive (number of cylinders, heads, etc.). This information should be provided in the documentation for the hard drive unit (this information is often specified on the exterior of the hard drive unit, as well).

Note: If your SBC has trouble detecting your hard drive when the Type field in the Standard CMOS Setup screen is set to AUTO, then you should enable the IDE HDD Auto Detection function in the CMOS Setup Utility screen. If the hard drive is still not detected, designate the Type as User and enter the hard-drive values into the Standard CMOS Setup screen

---

If the controller of the hard-disk drive interface is ESDI, the selection shall be "Type 1".

If the controller of the hard-disk drive interface is SCSI, the selection shall be "None"

If the controller of the hard-disk drive interface is CD-ROM, the selection shall be "None"

Type:

Describes the hard drive. Default value is AUTO. Other values: 1-45, user, and none.

CYLS.:

Denotes the number of cylinders in the specified drive type.

HEADS:

Denotes the number of heads in the specified drive type.

PRECOM:

Precom is the read delay circuitry which takes into account the timing differences between the inner and outer edges of the surface of the disk platter. This number designates the starting cylinder of the signal.

LZONE:

Lzone is the landing zone of the heads. This number determines the cylinder location where the heads will normally park when the system is shut down.

SECTORS:

Denotes the number of sectors in the specified drive type.

Size (Capacity):

Denotes the formatted capacity of the drive based on the following formula: (# of heads) X (# of cylinders) X (# of sectors) X (512bytes/sectors)

Drive A and Drive B:

The options are 360 KB 5.25in, 1.2 KB 5.25in, 720 KB 3.5in, 1.44 MB 3.5in, 2.88 MB 3.5in and None. Not Installed could be used as an option for workstations without disk drives.

Video:

Options are Monochrome, Color 40, VGA/EGA (default), Color 80.

Halt On:

Options are *No Errors*, *All but Keyboard*, *All but Diskette*, *All but Diskette/Keyboard*, *All Errors*. Default is *No Errors*.

Hard Disk Attributes:

Type	Cylinders	Heads	V-P comp	LZone	Sect	Capacity
1	306	4	128	305	17	10
2	615	4	300	615	17	20
3	615	6	300	615	17	30
4	940	8	512	940	17	62
5	940	6	512	940	17	46
6	615	4	65535	615	17	20
7	642	8	256	511	17	30
8	733	5	65535	733	17	30
9	900	15	65535	901	17	112
10	820	3	65535	820	17	20
11	855	5	65535	855	17	35
12	855	7	65535	855	17	49
13	306	8	128	319	17	20
14	733	7	65535	733	17	42
15	000	0	0000	000	00	00
16	612	4	0000	663	17	20
17	977	5	300	977	17	40
18	977	7	65535	977	17	56
19	1024	7	512	1023	17	59
20	733	5	300	732	17	30
21	733	7	300	732	17	42
22	733	5	300	733	17	30
23	306	4	0000	336	17	10
24	977	5	65535	976	17	40
25	1024	9	65535	1023	17	76
26	1224	7	65535	1223	17	71
27	1224	11	65535	1223	17	111
28	1224	15	65535	1223	17	152
29	1024	8	65535	1023	17	68
30	1024	11	65535	1023	17	93
31	918	11	65535	1023	17	83
32	925	9	65535	926	17	69
33	1024	10	65535	1023	17	85
34	1024	12	65535	1023	17	102
35	1024	13	65535	1023	17	110
36	1024	14	65535	1023	17	119
37	1024	2	65535	1023	17	17
38	1024	16	65535	1023	17	136
39	918	15	65535	1023	17	114
40	820	6	65535	820	17	40
41	1024	5	65535	1023	17	42
42	1024	5	65535	1023	26	65
43	809	6	65535	852	17	40
44	809	6	65535	852	26	61
45	776	8	65535	775	33	100
47			AUTO			

Figure C-5. Award Hard Disk Type Table

The BIOS Features Setup Menu

The BIOS FEATURES SETUP menu presents configuration options for the support chipset and the shadowing of RAM. When you select BIOS FEATURES SETUP in the *CMOS Setup Utility* menu, this screen appears:

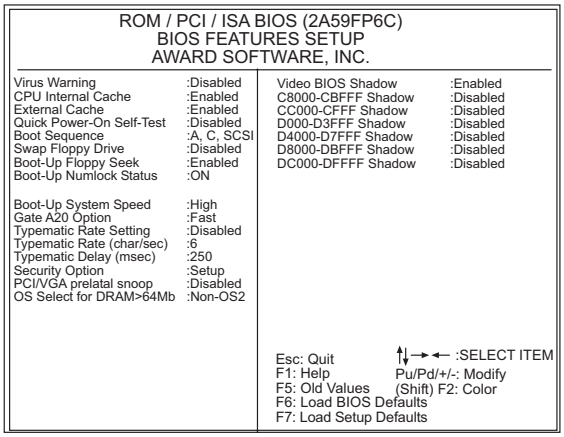


Figure C-6. BIOS Features Setup

The parameters accessible on this screen govern the system's default speed, boot-up sequence, keyboard operation, shadowing, and security.

Note: MultiTech presets all BIOS features before shipping the Gatekeeper. BIOS features should not be changed except by expert operators.

Virus Warning

When this item is enabled, the Award BIOS will monitor the boot sector and partition table of the hard disk drive for any attempt at modification. If an attempt is made, the BIOS will halt the system and the following error message will appear.

! **WARNING** !

Disk boot sector is to be modified
Type Y to accept write or N to abort write
Award Software, Inc.

Afterwards, if necessary, you will be able to run an anti-virus program to locate and remove the problem before any damage is done.

Enabled: Activates automatically when the system boots up. Causes a warning message to appear when anything attempts to access the boot sector or hard disk partition table.

Disabled: No warning message will appear when anything attempts to access the boot sector or hard disk partition table. (Default.)

NOTE: Many disk diagnostic programs which attempt to access the boot sector table can cause the above warning message. If you will be running such a program, we recommend that you disable Virus Protection beforehand. When enabled, this feature can cause problems when installing Windows 95.

CPU Internal Cache/External Cache

These two settings affect memory access speed, generally increasing access speed when enabled. The default value is Enabled.

Enabled: Enable cache

Disabled: Disable cache

Quick Power On Self Test

This setting affects the duration of the Power On Self Test (POST), which occurs after you power up the computer. If enabled, the BIOS will shorten or skip some 'check items' during the POST.

Enabled: Enable quick POST (Default)

Disabled: Normal POST

Boot Sequence

This setting determines which drive to search first for booting files at startup. The default value is C, A.

C, A System will first search for a hard disk then a floppy disk drive.

A, C System will first search for a floppy disk drive, then for a hard drive.

Boot Up Floppy Seek

During POST, BIOS will determine if the floppy disk drive installed has 40 or 80 tracks. 360K type has 40 tracks while 760K, 1.2M and 1.44M are all 80-track devices.

Enabled: BIOS searches for the floppy disk drive to determine if it is 40 or 80 tracks. Note that BIOS cannot tell from 720K, 1.2M or 1.44M drive type as they are all 80 tracks (Default).

Disabled: BIOS will not search for the type of floppy disk drive by track number. Note that there will not be any warning message if the drive installed is 360K.

Boot Up NumLock Status

This enables you to determine the default state of the numeric keypad. By default, the system boots up with NumLock on.

On	Keypad's number keys are active.
Off	Keypad's arrow keys are active.

Boot Up System Speed

Selects the default system speed — the normal operating speed at power up.

High	Sets the speed to high (default)
Low	Sets the speed to low

Regardless of which setting is chosen, the operator can still use the turbo switch to toggle between High and Low modes during operation.

Gate A20 Option

This entry enables you to select how gate A20 is handled. Gate A20 is a device used to address memory above 1 Mbyte. Initially, Gate A20 was handled by a pin on the keyboard. Today, while keyboards still provide this support, it is more common, and much faster, for the system chipset to provide support for gate A20.

Normal keyboard (default)

Fast chipset

Typematic Rate Setting

Enable the "typematic" function if you want to be able to configure the key-repetition characteristics of your keyboard. When typematic is disabled, continually holding down a key on your keyboard will generate only one instance. In other words, the BIOS will only report that the key is down. When the typematic rate is enabled, the BIOS will report as before, but it will then wait a moment, and, if the key is still down, it will begin the report that the key has been depressed repeatedly. For example, you would use such a feature to accelerate cursor movements with the arrow keys.

Enabled	Enable typematic rate
Disabled	Disable typematic rate (default)

Typematic Rate (Chars/Sec)

When the typematic rate is enabled, the "typematic rate" selection enables you select the rate at which a 'held-down' key will produce "acceleration." Acceleration refers to multiple instances of a

character (letter, number, or symbol) or other multiple keyboard effects (like cursor movement with arrow keys and character removal with the Delete keys).

6	6 characters per second (default)
8	8 characters per second
10	10 characters per second
12	12 characters per second
15	15 characters per second
20	20 characters per second
24	24 characters per second

30 30 characters per second

Typematic Delay (Msec)

When the typematic rate is enabled, this selection enables you to select the delay between when the key is first depressed and when the acceleration begins.

250 250 msec (default)

500 500 msec

750 750 msec

1000 1000 msec

Security Option

Enables you to limit access to the computer system or to the BIOS Setup menus. When System security is enabled, the system will not boot and access to Setup will be denied if the correct password is not entered at the prompt. When Setup security is enabled, the system will boot, but access to Setup will be denied if the correct password is not entered at the prompt.

System security boot & BIOS access require password

Setup security BIOS access requires password (default)

No security password not required

***Note**: To disable security, select PASSWORD SETTING at the CMOS Setup Utility menu. You will be asked to enter a password. Do not type anything; just press Enter, and security will be disabled. Once it's disabled, the system will boot and you can enter Setup freely.*

Video BIOS Shadow

Determines whether the video BIOS will be copied to RAM. However, it is optional depending on chipset design. Video Shadow will increase the video speed.

Enabled Video shadow is enabled (default)

Disabled Video shadow is disabled

C8000 - CFFFF Shadow/DC000 - DFFFF Shadow

Determines whether option ROMs will be copied to RAM or not. An example of such option ROM would be support of on-board SCSI hard-drive functionality.

Enabled Optional shadow is enabled

Disabled Optional shadow is disabled (Default)

Chipset Features Setup

This menu lets you configure the system based on the specific features of the installed chipset. This chipset manages bus speeds and access to system memory resources, such as DRAM and the external cache. It also coordinates communications between the conventional ISA bus and the PCI bus. However, these parameters should never need to be altered. The default settings have been chosen because they provide the best operating conditions for your system. The only time you might consider making any changes would be if you discovered that data was being lost while using your system.

If you choose CHIPSET FEATURES SETUP from the *CMOS Setup Utilities* menu, the following screen appears.

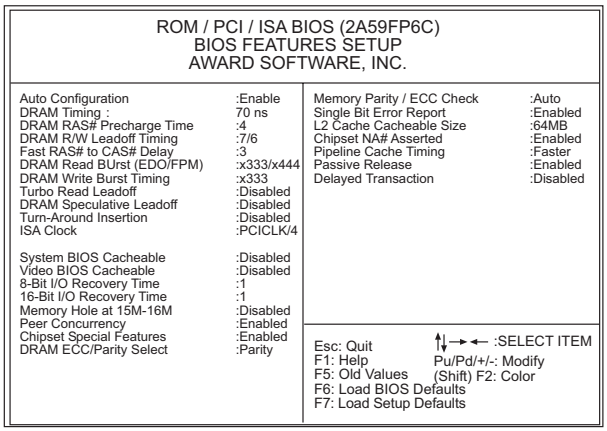

ROM / PCI / ISA BIOS (2A59FP6C)
BIOS FEATURES SETUP
AWARD SOFTWARE, INC.
Auto Configuration :Enable
DRAM Timing : 70 ns
DRAM RAS# Precharge Time :4
DRAM R/W Leadoff Timing :7/6
Fast RAS# to CAS# Delay :3
DRAM Read BUrst (EDO/FPM) :x333/x444
DRAM Write Burst Timing :x333
Turbo Read Leadoff :Disabled
DRAM Speculative Leadoff :Disabled
Turn-Around Insertion :Disabled
ISA Clock :PCICLK/4
System BIOS Cacheable :Disabled
Video BIOS Cacheable :Disabled
8-Bit I/O Recovery Time :1
16-Bit I/O Recovery Time :1
Memory Hole at 15M-16M :Disabled
Peer Concurrency :Enabled
Chipset Special Features :Enabled
DRAM ECC/Parity Select :Parity
Memory Parity / ECC Check :Auto
Single Bit Error Report :Enabled
L2 Cache Cacheable Size :64MB
Chipset NA# Asserted :Enabled
Pipeline Cache Timing :Faster
Passive Release :Enabled
Delayed Transaction :Disabled
Esc: Quit
F1: Help
F5: Old Values
F6: Load BIOS Defaults
F7: Load Setup Defaults
:SELECT ITEM
Pu/Pd/+/-: Modify
(Shift) F2: Color

Figure C-7. Chipset Features Setup

By moving cursor to the desired field and pressing < F1 > key, all values for that field will be displayed.

Auto Configuration Function:

When this option is Enabled, the BIOS automatically configures cache and clock settings based on detection of the CPU clock speed. The user cannot change the other parameters. Set this option to `Disabled` to do manual setting of DRAM , cache, and I/O bus clock operating parameters. `Enabled` is the default.

DRAM Settings

The first chipset settings deal with CPU access to dynamic random access memory (DRAM). The default timings have been carefully chosen and should only be altered if data is being lost. One data-loss scenario that relates to DRAM timing values occurs when the computer contains mixed-speed DRAM chips; greater delays may be required to preserve the integrity of the data held in the slower memory chips and, consequently, data may be lost.

ISA Clock:

Defines the clock value for the ISA bus. Usually, the ISA bus clock should be programmed to 8 Mhz. For example, when the PCI clock is 33MHz, choose PCICLK/4. PCICLK/4 is the default value.

Cache Features

System BIOS Cacheable

When enabled, accesses to the system BIOS ROM addressed at F0000H-FFFFFH are cached.

Enabled BIOS access cached

Disabled BIOS access not cached

Disabled is the default.

Video BIOS Cacheable

As with caching the System BIOS above, enabling the Video BIOS cache will cause access to video BIOS addressed at C0000H to C7FFFH to be cached.

Enabled Video BIOS access cached

Disabled Video BIOS access not cached

Disabled is the default.

PCI and IDE Configuration

8 Bit I/O Recovery Time

The recovery time is the length of time, measured in CPU clock periods, that the system will delay after completing an input/output request. This delay occurs because the CPU operates much faster than the input/output bus and, therefore, the CPU must be delayed to allow for the completion of the I/O.

This setting determines the recovery time allowed for 8 bit I/O. Choices are from 1 to 8 CPU clock periods.

3 clock periods is the default setting.

16 Bit I/O Recovery Time

This setting determines the recovery time allowed for 16 bit I/O. Choices are from 1 to 4 CPU clock periods.

2 clock periods is the default setting.

Memory Hole At 15M-16M

In order to improve performance, certain space in memory can be reserved for ISA cards. This memory must be mapped into the memory space below 16 MB.

Enabled	memory hole supported
Disabled	memory hole not supported (default)

Power Management Setup

The Power Management Setup enables you to configure your system to save energy most effectively while still meeting your computing needs. When you specify "Max Saving," all power-saving timeouts are set to their minimum value and power saving is implemented at the lowest possible threshold.

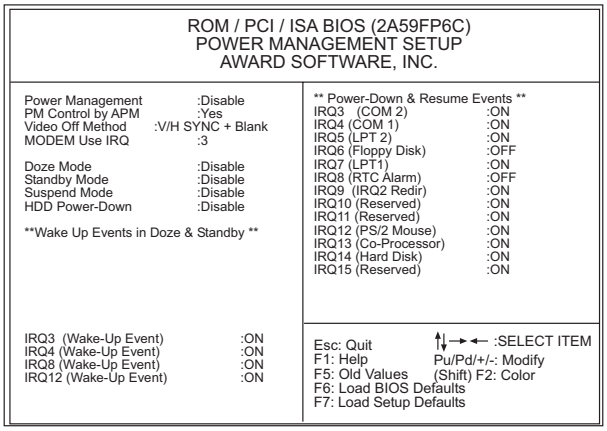


Figure C-8. Power Management Setup

Power Management

This field lets you select the type (or degree) of power saving used. There are four modes of power management:

1. Doze Mode
2. Standby Mode
3. Suspend Mode
4. HDD Power Down

There are four selections for Power Management, three of which have fixed mode settings.

Disable (default) No power management. Disables all four modes.

Min. Power Saving Minimum power management.
Doze Mode = 1hr.,
Standby Mode = 1 hr.,
Suspend Mode = 1hr., and
HDD Power Down = 15 min.

Max. Power Saving Maximum power management — ONLY AVAILABLE FOR SL CPUs.
Doze Mode = 1 min.,
Standby Mode = 1 min.,
Suspend Mode = 1 min., and
HDD Power Down = 1 min.

User Defined. Enables you to set each mode individually. When not disabled, each of the ranges are from 1 min. to 1 hr. except for HDD Power Down which ranges from 1 min. to 15 min. (HDD can also be disabled).

PM Control APM

When enabled (`YES`), an Advanced Power Management device will be activated to enhance the *Maximum Power Saving* mode and to stop the CPU internal clock. The Advanced Power Management function operates only if *Maximum Power Saving* is enabled. When enabled (`YES`), the system BIOS will wait for APM's prompt before it enters any PM mode *(Doze, Standby* or *Suspend)*. If APM is installed, and if a task is running and the timer has timed out, APM will not prompt the BIOS to employ *any* power saving mode.

Video Off Method

This determines how the monitor is blanked (V/H SYNC+Blank). This selection will cause the system to turn off the vertical and horizontal synchronization ports and write blanks to the video buffer (Blank Screen). This option only writes blanks to the video buffer.

Note: *Doze, Standby, and Suspend are configurable only when* `User Defined` *power management has been selected.*

Doze Mode

This timeout setting determines how long the PC must be idle before entering *Doze* mode. Values range from 10 seconds to 2 hours. *Doze* mode can also be disabled. In *Doze* mode, the CPU clock runs at a slower speed while all other devices continue operating at full speed.

Standby Mode

This timeout setting determines how long the PC must be idle before entering *Standby* mode. Values range from 30 seconds to 2 hours. *Standby* can also be disabled. When *Standby* mode is engaged, the PC's hard drive and its video are turned off while all other devices continue operating at full speed.

Suspend Mode

This timeout setting determines how long the PC must be idle before entering *Suspend* mode. Values range from 30 seconds to 2 hours. *Suspend* can also be disabled. In *Suspend* mode, all devices except the CPU are shut off.

HDD Power Down

This timeout setting determines how long the PC must be idle before entering *HDD Power Down* mode. In *HDD Power Down* mode, the hard disk drive will be shut off but all other devices remain active.

PnP/PCI Configuration

If you choose PNP/PCI CONFIGURATION from the *CMOS Setup Utility* menu, the following screen will appear:

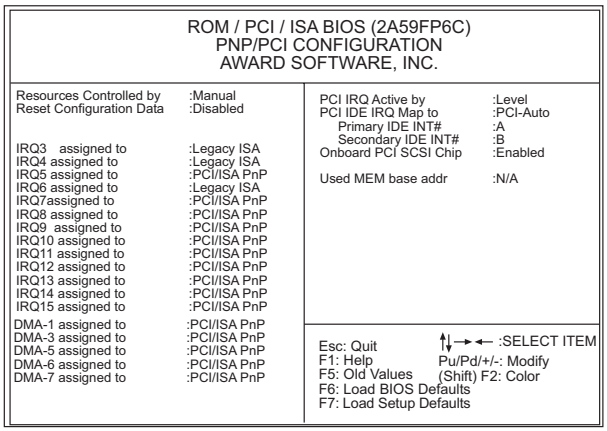

ROM / PCI / ISA BIOS (2A59FP6C)
PNP/PCI CONFIGURATION
AWARD SOFTWARE, INC.
Resources Controlled by :Manual
Reset Configuration Data :Disabled
IRQ3 assigned to :Legacy ISA
IRQ4 assigned to :Legacy ISA
IRQ5 assigned to :PCI/ISA PnP
IRQ6 assigned to :Legacy ISA
IRQ7assigned to :PCI/ISA PnP
IRQ8 assigned to :PCI/ISA PnP
IRQ9 assigned to :PCI/ISA PnP
IRQ10 assigned to :PCI/ISA PnP
IRQ11 assigned to :PCI/ISA PnP
IRQ12 assigned to :PCI/ISA PnP
IRQ13 assigned to :PCI/ISA PnP
IRQ14 assigned to :PCI/ISA PnP
IRQ15 assigned to :PCI/ISA PnP
DMA-1 assigned to :PCI/ISA PnP
DMA-3 assigned to :PCI/ISA PnP
DMA-5 assigned to :PCI/ISA PnP
DMA-6 assigned to :PCI/ISA PnP
DMA-7 assigned to :PCI/ISA PnP
PCI IRQ Active by :Level
PCI IDE IRQ Map to :PCI-Auto
Primary IDE INT# :A
Secondary IDE INT# :B
Onboard PCI SCSI Chip :Enabled
Used MEM base addr :N/A
Esc: Quit
F1: Help
F5: Old Values
F6: Load BIOS Defaults
F7: Load Setup Defaults
:SELECT ITEM
Pu/Pd/+/-: Modify
(Shift) F2: Color

Figure C-9. PNP/PCI Configuration

You can manually configure the Plug-and-Play/PCI Device's IRQ. The default setting is `Auto`.

PCI IRQ Activated by

This sets the method by which the PCI bus recognizes that an IRQ service is being requested by a device. Under all circumstances, you should retain the default configuration unless advised otherwise by your system's manufacturer.

Choices are Level (default) and Edge.

PCI IDE IRQ Map to

This enables you to configure your system to the type of IDE disk controller in use, ISA or PCI (default value is PCI Auto). PCI Auto enables the system to determine automatically how your IDE disk system is configured. Remember that this setting refers to the hard disk drive itself, rather than individual partitions. Since each IDE controller supports two separate hard drives, you can select the interrupt number (the "INT#"; the possible values are A, B, C, or D) for each. Note that the primary drive always has a lower interrupt than the secondary drive.

Onboard PCI SCSI Chip

Default is `Disabled`. The IPC-551 SBC does not support SCSI.

Load BIOS Defaults

Auto Configuration with BIOS Defaults

Choosing LOAD BIOS DEFAULTS from the CMOS Setup Utility menu will restore default BIOS values to the PC. Invoking LOAD BIOS DEFAULTS will bring up this dialog box:

```
Load BIOS Default ( Y ? N ) ? Y
```

To use the BIOS defaults, change the prompt to "Y" and press `Enter` ; the default BIOS values will be loaded into CMOS automatically the next time you power up the SBC. *Load BIOS Defaults* are the same as *Load Setup Defaults*.

Load Setup Defaults

Auto Configuration with Setup Defaults

Choosing LOAD SETUP DEFAULTS from the CMOS Setup Utility menu will restore default SETUP values to the PC. Invoking LOAD SETUP DEFAULTS brings up this dialog box:

```
Load SETUP Default ( Y ? N ) ? Y
```

To use the SETUP defaults, change the prompt to "Y" and press <Enter>; the default SETUP values will be loaded into the CMOS automatically the next time you power up the SBC. *Load Setup Defaults* are the same as *Load BIOS Defaults*.

Integrated Peripherals

If you choose INTEGRATED PERIPHERALS from the CMOS Setup Utility menu, this screen will appear:

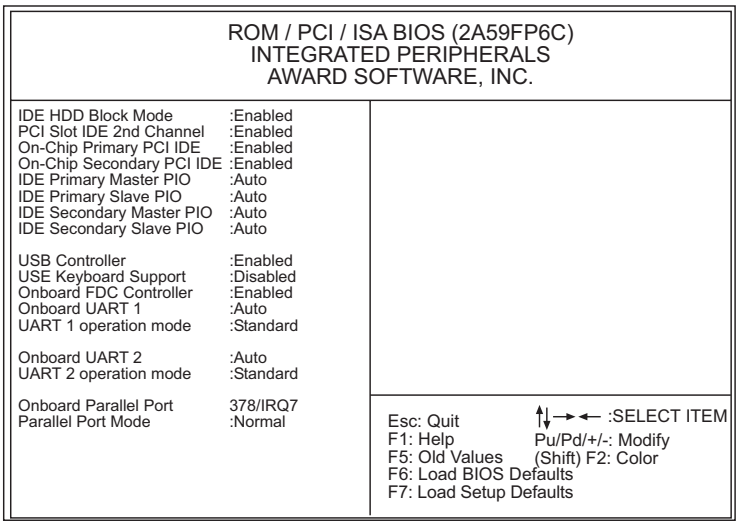
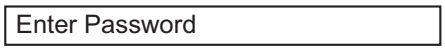

ROM / PCI / ISA BIOS (2A59FP6C)
INTEGRATED PERIPHERALS
AWARD SOFTWARE, INC.
IDE HDD Block Mode :Enabled
PCI Slot IDE 2nd Channel :Enabled
On-Chip Primary PCI IDE :Enabled
On-Chip Secondary PCI IDE :Enabled
IDE Primary Master PIO :Auto
IDE Primary Slave PIO :Auto
IDE Secondary Master PIO :Auto
IDE Secondary Slave PIO :Auto
USB Controller :Enabled
USE Keyboard Support :Disabled
Onboard FDC Controller :Enabled
Onboard UART 1 :Auto
UART 1 operation mode :Standard
Onboard UART 2 :Auto
UART 2 operation mode :Standard
Onboard Parallel Port 378/IRQ7
Parallel Port Mode :Normal
:SELECT ITEM
Esc: Quit
F1: Help
Pu/Pd/+/-: Modify
F5: Old Values
(Shift) F2: Color
F6: Load BIOS Defaults
F7: Load Setup Defaults

Figure C-10. Integrated Peripherals

Password Setting

Access to the computer system in general or to the BIOS settings in particular can be put under password protection using this function. When you select PASSWORD SETTING on the *CMOS Setup Utility* menu, the following dialog box will appear at the center of the screen to assist you in creating a password.



Type the password, up to eight characters in length, and press `Enter`. The password typed now will clear any previously entered password from CMOS memory. You will be asked to confirm the password. Type the password again and press `Enter`. You may also press `Esc` to abort the selection and *not* enter a password.

Caution: Losing or forgetting your system password will render your computer unusable. Assign a password only if it is necessary for security purposes. Restoring access after loss of a password is nontrivial and requires the clearing and re-loading of BIOS settings. If a password is forgotten or lost, contact MultiTech Technical Support to establish a new password.

To disable a password, just press `Enter` when you are prompted to enter the password. A message will confirm that the password is to be disabled. Once the password has been disabled, the system will boot and you can enter Setup freely.

When a password has been enabled, you will be prompted to enter it every time you try to enter Setup. This prevents an unauthorized person from changing any part of your system configuration.

Additionally, when a password is enabled, you can also require the BIOS to request a password every time your system is rebooted. This would prevent unauthorized use of your computer.

You determine when the password is required within the *BIOS Features Setup* menu and its Security option (presented earlier). If the Security option is set to `System`, the password will be required both at boot and at entry to Setup. If set to Setup, prompting only occurs when trying to enter Setup.

IDE HDD Auto Detection

The parameters presented on this menu are pre-set at the factory. They should be altered only by expert users.

This feature automatically detects and configures hard disk drive parameters. If you are uncertain of your hard disk drive's parameters, this features will display them. Generally, the IDE HDD Auto Detection function is needed only if you change your hard disk drive.

When you select IDE HDD AUTO DETECTION from the *CMOS Setup Utility* menu, this screen will appear:

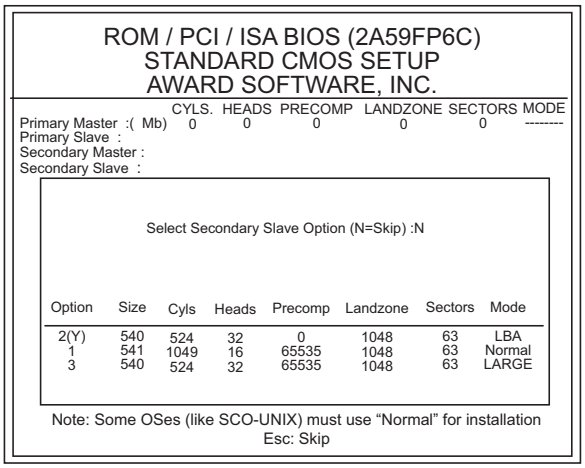

ROM / PCI / ISA BIOS (2A59FP6C)
STANDARD CMOS SETUP
AWARD SOFTWARE, INC.
CYLS. HEADS PRECOMP LANDZONE SECTORS MODE
Primary Master :(Mb) 0 0 0 0 0 --------
Primary Slave :
Secondary Master :
Secondary Slave :
Select Secondary Slave Option (N=Skip) :N
Option Size Cyls Heads Precomp Landzone Sectors Mode
2(Y) 540 524 32 0 1048 63 LBA
1 541 1049 16 65535 1048 63 Normal
3 540 524 32 65535 1048 63 LARGE
Note: Some OSes (like SCO-UNIX) must use "Normal" for installation
Esc: Skip

Figure C-11. IDE HDD Auto Detection Screen

Generally speaking, hard disk drives are categorized by size as follows:

Normal: HDD Size < 528MB

LBA: 528MB< HDD Size < 8.4 GB

Large: HDD Size > 8.4GB

If you specify a sub-standard mode for a hard disk drive when formatting, part of the drive will remain unformatted and therefore inaccessible. For example, if you format a 4GB hard disk drive as a Normal drive, only 528MB would be formatted and nearly 3.5GB would be unusable.

Auto Detection

The BIOS Setup will display all the possible modes that are supported by the HDD including NORMAL, LBA, & LARGE. The user can select the appropriate mode.

HDD Mode

The Award BIOS supports 3 HDD mode: NORMAL, LBA, & LARGE

NORMAL mode:

Generic access mode in which neither the BIOS nor the IDE controller will make any transformations during accessing.

The maximum number of cylinders, heads & sectors for NORMAL mode are 1024, 16, and 63.

x no. Cylinder (1024)

x no. Head (16)

x	no. Sector	(63)
x	no. Bytes per Sector	(512)
Total:		528 megabytes

If the user sets the HDD to NORMAL mode, the maximum accessible HDD size will be 528 Megabytes even though its physical size may be greater than that.

LBA (Logical Block Addressing) mode:

This new HDD accessing method overcomes the 528 megabyte bottleneck. The number of cylinders, heads and sectors shown in Setup may not be the number physically contained in the HDD.

During HDD accessing, the IDE controller will transform the logical address described by the sector, head, and cylinder numbers into its own physical address inside the HDD.

The maximum HDD size supported by LBA mode is 8.4 gigabytes, which is obtained by the following formula:

x	no. Cylinder	(1024)
x	no. Head	(255)
x	no. Sector	(63)
x	no. of Bytes per Sector	(512)
Total:		8.4 gigabytes

LARGE mode:

Some IDE HDDs contain more than 1024 cylinder without LBA support (in some cases, users do not want LBA). The BIOS provides another alternative to support these kinds of HDD.

CYLS	HEADS	SECTOR	MODE
1120	16	59	NORMAL
560	32	59	LARGE

The BIOS tricks DOS (or other OS) that the number of cylinders is less than 1024 by dividing it by 2. At the same time, the number of heads is multiplied by 2. A reverse transformation process will be made inside INT 13h in order to access the right HDD address.

Maximum HDD size in Large Mode:

x	no. Cylinder	(1024)
x	no. Head	(32)
x	no. Sector	(63)
x	no. Per sector	(512)
Total:		1 gigabyte

Note: Support of the LBA or LARGE mode of HDDs, requires some special software. All such software packages are located in the Award HDD Service Routine (INT 13h). If the PC is running under a Operating System that replaces the whole INT 13h, that PC may fail to access a HDD set to LBA or LARGE mode.

HDD Low Level Format

If you choose HDD LOW LEVEL FORMAT from the CMOS Setup Utility menu, the following screen will appear:

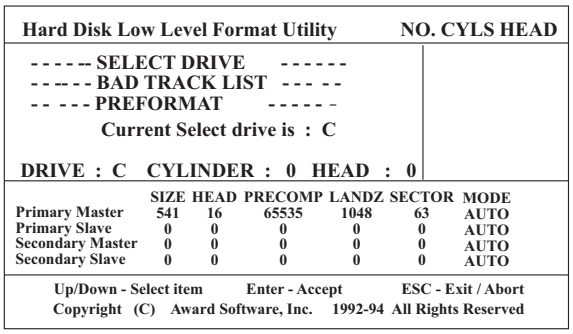

Hard Disk Low Level Format Utility NO. CYLS HEAD
SELECT DRIVE
BAD TRACK LIST
PREFORMAT
Current Select drive is : C
DRIVE : C CYLINDER : 0 HEAD : 0
SIZE HEAD PRECOMP LANDZ SECTOR MODE
Primary Master 541 16 65535 1048 63 AUTO
Primary Slave 0 0 0 0 0 AUTO
Secondary Master 0 0 0 0 0 AUTO
Secondary Slave 0 0 0 0 0 AUTO
Up/Down - Select item Enter - Accept ESC - Exit / Abort
Copyright (C) Award Software, Inc. 1992-94 All Rights Reserved

Figure C-12. HDD Low Level Format

Low-level formatting will sometimes remedy corrupt disk sectors. Unlike DOS formatting which can format disk partitions separately, Low-level formatting formats the entire physical hard disk drive. To invoke low-level formatting, select PREFORMAT and press `Enter`.

Caution: Low-level formatting will destroy all data on the hard disk drive. If you really want to reformat a hard disk drive, back up your data first.

Save & Exit Setup

When all required adjustments are complete, you must save these settings into the CMOS RAM. Select SAVE & EXIT SETUP and press `Enter`.

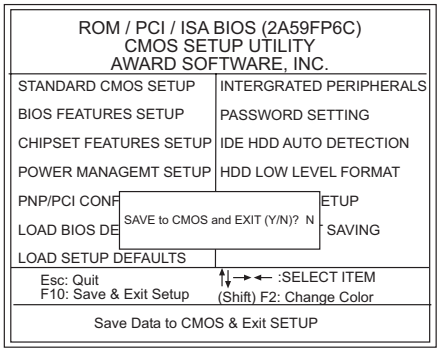


Figure C-13. Saving a CMOS Setup Configuration

When you confirm that you want to save the settings, your machine will automatically reboot and the changes you have made will be implemented. You can call up the setup program at any time to adjust any of the individual items by pressing the <`Del`> key during boot up.

To cancel any changes you have made, select QUIT WITHOUT SAVING (see figure below) and the original settings stored in CMOS will be retained.

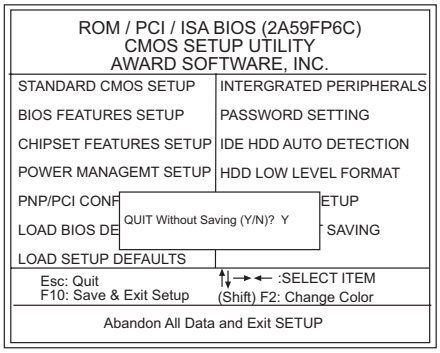


Figure C-14. Exiting Setup Mode without Saving

Appendix D — Regulatory Information

FCC Regulations for Telephone Line Interconnection

1. This equipment complies with Part 68 of the Federal Communications Commission (FCC) rules. On the outside surface of this equipment is a label that contains, among other information, the FCC registration number and ringer equivalence number (REN). If requested, this information must be provided to the telephone company.
2. As indicated below, the suitable jack (Universal Service Order Code connecting arrangement) for this equipment is shown. If applicable, the facility interface codes (FIC) and service order codes (SOC) are shown.

   An FCC-compliant telephone cord and modular plug is provided with this equipment. This equipment is designed to be connected to the telephone network or premises wiring using a compatible modular jack which is Part 68 compliant.

3. The ringer equivalence number (REN) is used to determine the quantity of devices that may be connected to the telephone line. Excessive REN's on the telephone line may result in the devices not ringing in response to an incoming call. In most, but not all areas, the sum of the RENs should not exceed five (5.0). To be certain of the number of devices that may be connected to the line, as determined by the total REN's, contact the telephone company to determine the maximum REN for the calling area.
4. If this equipment causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required. But if advance notice isn't practical, the telephone company will notify the customer as soon as possible. Also, you will be advised of your right to file a complaint with the FCC if you believe it is necessary.
5. The telephone company may make changes in its facilities, equipment, operations, or procedures that could affect the operation of the equipment. If this happens, the telephone company will provide advance notice in order for you to make necessary modifications in order to maintain uninterrupted service.
6. If trouble is experienced with this equipment (the model of which is indicated below) please contact Multi-Tech Systems, Inc. at the address shown below for details of how to have repairs made. If the equipment is causing harm to the telephone network, the telephone company may request you remove the equipment from the network until the problem is resolved.
7. No repairs are to be made by you. Repairs are to be made only by Multi-Tech Systems or its licensees. Unauthorized repairs void registration and warranty.
8. This equipment cannot be used on public coin service provided by the telephone company. Connection to Party Line Service is subject to state tariffs. (Contact the state public utility commission, public service commission or corporation commission for information.)

9. If so required, this equipment is hearing-aid compatible.

Manufacturer:	Multi-Tech Systems, Inc.
Model Number:	MVPGTK1
FCC registration number:	AU7USA-XXXXXXXXXXX
Ringer Equivalence No:	TBD
Modular Jack (USOC)	RJ11C or RJ11W (single line)
Service Center in USA:	Multi-Tech Systems Inc.
	2205 Woodale Drive
	Mounds View, MN 55112
	Voice (763) 785-3500/
	FAX (763) 785-9874

Canadian Limitations Notice

Notice: The ringer equivalence number (REN) assigned to each terminal device provides an indication of the maximum number of terminals allowed to be connected to a telephone interface. The termination of a interface can consist of any combination of devices subject only to the requirement that the sum of the ringer equivalence numbers of all the devices does not exceed 5.

Notice: The Industry Canada label identifies certificated equipment. This certification means that the equipment meets certain telecommunications network protective, operational and safety requirements. The Industry Canada does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be made by an authorized Canadian maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

Caution: Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.

Compliance with BABT Requirements

Approved for connection to telecommunications system specified in the instructions for use subject to the conditions set out in them.

Warning: Interconnection directly, or by way of other apparatus, of ports marked "SAFETY WARNING see instructions for use" with ports marked or not so marked may produce hazardous conditions on the network. Advice should be obtained from a competent engineer before such a connection is made.

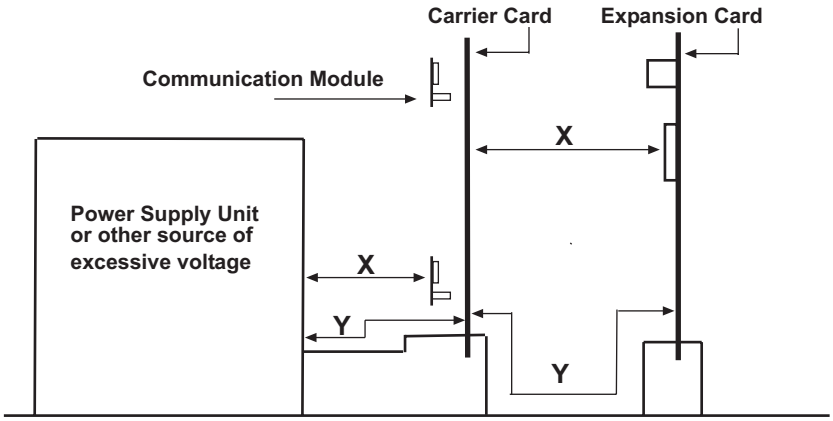
It is a condition of approval that the power required by the host and the total of all adapter cards installed within the host environment, together with any auxiliary apparatus, does not exceed the power specification as stated in the Technical Reference Material of the host apparatus.

The power requirements for the MULTIMODEMISI are:
Modem operating voltages: +12V D.C., -12V D. C., +5V D.C.
Modem Power Consumption: 8 Watts

In order to maintain the independent approval of this card, it is essential that when other option cards are introduced which use or generate a hazardous voltage, the minimum creepages and clearances specified in the following table are maintained. A hazardous voltage is one which exceeds 42.4V peak a.c or 50V d.c. If you have any doubt, seek advice from a competent engineer before installing other adapters into the host equipment.

The equipment must be installed such that with the exception of connection to the host, clearance and creepage distances shown in the following table are maintained between the card and any other assemblies which use or generate a voltage shown in that table. The larger the distance shown in brackets applies where the local environment within the host is subject to conductive pollution or dry nonconductive pollution which could become conductive due to condensation. Failure to maintain these minimum distances would invalidate approval.

Clearance (mm)	Creepage (mm)	Voltage Used or Generated by Host or Other Cards
2.0	2.4 (3.8)	Up to 50 Vms or Vdc
2.6	3.0 (4.8)	Up to 125 Vms or Vdc
4.0	5.0 (8.0)	Up to 250 Vms or Vdc
4.0	6.4 (10.0)	Up to 300 Vms or Vdc



Example Diagram Showing Creepage and Clearance Distances

Fig. B-1. Example Diagram Showing Creepage and Clearance Distances

Except at the edge connector which plugs into the host's expansion slot, clearance distance (Xmm) and creepage distance (Ymm) as given in the table above, must be maintained between the communication card and any assemblies which use or generate hazardous voltage.

This apparatus has been approved for the use of the following facilities:

- Auto-calling
- Loop disconnect and MF dialing
- Phone number storage and retrieval by a predetermined code
- Operation in the absence of proceed indication
- Automatic storage of last number dialed
- Tone detection-busy
- Auto clear from the originating end
- DTR dialing
- Modem
- PBX timed break register recall

European Low Voltage Directive

When correctly installed and maintained, the modem will present no hazard to the user. When correctly installed, the modem will be connected to the PSTN or a PW and to a Data Terminal Equipment (DTE) whose modem connections comply with CCITT recommendation V28. The DTE connections are therefore taken to be safe voltages (less than ± 30 volts).

Ports that are capable of connecting to other apparatus are defined as SELV. To ensure conformity with EN41003, ensure that these ports are only connected to ports of the same type on other apparatus.

Compliance with BS6305 Clause 6.2, BS6320 Clause 7.2, and BABT/ SITS/82/005S/D

a. The modem is suitable for connection to the Public Switched Telephone Network (PSTN) provided by British Telecommunications plc or Kingston Communications (Hull) plc. Circuit supply by British Communications, Mercury Communication, or Hull City Council. Only direct exchange lines may be used, not shared service.

b. The modem is suitable for household, office, and similar general indoor use. It is not suitable for use as an extension to a payphone.

c. BT lines supplied must support either loop disconnect or multifrequency tone signalling.

d. REN (Ringer Equivalence Number).

The REN value of a unit is calculated from 3/n where n is the total number of units which can be connected in parallel which will still cause the standard bell (as defined in BS6305 Appendix D) to ring.

REN values of less than 0.3 cannot be assigned.

REN = 1

If a telephone or other device is connected in parallel with the modem, the combined REN must not exceed 4. A BT supplied telephone can be assumed to have REN of 1.0 unless otherwise noted.

The approval of this modem for connection to the British Telecom public switched telephone network is INVALIDATED if the apparatus is subject to any modification in any material way not authorized by BABT or if it is used with or connected to:

i. internal software that has not been formally accepted BABT.

ii. external control software or external control apparatus which cause the operation of the modem associated call set-up equipment to contravene the requirements of the standard set out in BABT/SITS/82/005S/D.

All other apparatus connected to this modem and thereby connected directly or indirectly to the British Telecom public switched telephone network must be approved apparatus as defined in Section 22 of the British Telecommunications Act 1984.

Compliance with BS6789: Section 3.1 and Part 2

a. The modem is not capable of allowing Auto Call using '999' or other PABX emergency numbers.

b. Modes other than modes 1, 2, or 3 should not be used on the BT PSTN. This modem is a mode 1 device.

c. Users are advised to check the numbers entered during the Auto Call set up phase prior to dialing.

d. The user should not issue any sequence of commands to the modem which would cause the modem to exceed the maximum allowable pause of 8 seconds from the time the modem goes off hook until dialing begins.

e. For correct operation of the call progress monitor, the power has to be properly connected and switched on.

Compliance with BS6328 Part 1

a. The modem is not suitable for use on circuits with British Telecommunications signaling at a normal frequency of 2280 Hz.

b. The modem does not require signaling or otherwise employ the frequency range dc to 200 Hz.

c. The modem does not require dc from the Private Circuit for correct operation. The modem may be damaged if connected, in a private circuit mode, to a circuit supplying dc current (the maximum permissible direct current is zero amps).

CE

EMC, Safety, and Terminal Directive Compliance

The CE mark is affixed to this product to confirm compliance with the following European Community Directives:

Council Directive 89/336/EEC of 3 May 1989 on the approximation of laws of Member States relating to electromagnetic compatibility;

and

Council Directive 73/23/EEC of 19 February 1973 on the harmonization of the laws of Member States relating to electrical equipment designed for use within certain voltage limits;

and

Council Directive 98/13/EEC of 22 March 1998 on the approximation of the laws of the Member States concerning telecommunications terminal and satellite earth station equipment.

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